Chesterfield County
Annual Stormwater Management And Monitoring Report 2014

Water Quality Investigation – Swift Creek east of Interstate 95, July 2014

Chesterfield County
Department of Environmental Engineering
Water Quality Section
April 2015

Stormwater Management Program - Table of Contents

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List of Acronyms:

BI =	Chesterfield County Department of Building Inspections
BMP =	Best Management Practice
BOS =	Chesterfield County Board of Supervisors
CCPLC =	Chesterfield County Performance and Learning Center
CIP =	Capital Improvement Program
CBPA =	Chesapeake Bay Preservation Act
CCPSS =	Chesterfield County Public School System
CompPlan =	"Moving Forward - The Comprehensive Plan for Chesterfield County"
County =	Chesterfield County
Drainage =	Chesterfield County Department of Environmental Engineering – Drainage Section
DOGS =	Chesterfield County Department of General Services
ED =	Chesterfield County Department of General Services – Environmental Division
EE =	Chesterfield County Department of Environmental Engineering
EPA =	U.S. Environmental Protection Agency
EPT =	Ephemeroptera, Plecoptera and Trichoptera
ESC =	Erosion and Sediment Control
Extension =	Virginia Cooperative Extension Service

Fleet =	Chesterfield County Department of General Services – Fleet Management Division
FEMS =	Chesterfield County Fire and EMS
GIS =	Geographic Information System
GPS=	Geographic Positioning System
Health =	Virginia Department of Health, Chesterfield Health District
HSI =	Hotspot Site Investigation
IDDE =	Illicit Discharge Detection and Elimination
IDO =	Chesterfield County Illicit Discharge Ordinance
LDP =	Land Disturbance Permits
LID =	Low Impact Development
MDL=	Method Detections Limit
MS4 =	Municipal Separate Storm Sewer System
NOV =	Notice of Violation
Parks =	Chesterfield County Department of Parks and Recreation
Planning =	Chesterfield County Planning Department
Pretreatment =	Chesterfield County Utilities Department – Pretreatment Section
RPA =	Resource Protection Area
RPAD =	Resource Protection Area Designation
SAP =	Sampling and Analysis Plan
SPCC =	Spill Prevention Control and Countermeasure
SLAF =	Stormwater Local Assistance Fund
SWM =	Stormwater Management structure
SWPPP =	Stormwater Pollution Prevention Plan
TMDL =	Total Maximum Daily Load
Utilities =	Chesterfield County Utilities Department
VA DCR =	Virginia Department of Conservation and Recreation
VA DEM =	Virginia Department of Emergency Management
VA DEQ =	Virginia Department of Environmental Quality
VA DOF =	Virginia Department of Forestry
VDACS =	Virginia Department of Agriculture and Consumer Services
VDOT =	Virginia Department of Transportation
VPDES=	Virginia Pollutant Discharge Elimination System
VSCI =	Virginia Stream Condition Index
VSMP =	Virginia Stormwater Management Program
WASP =	Watershed Assessment and Stream Protection Program
Wastewater =	Chesterfield County Utilities Department – Wastewater Collections Division
WQ=	Chesterfield County Department of Environmental Engineering – Water Quality Section
WQP =	Chesterfield County Water Quality Protection Plan

Executive Summary

The following document presents the data and information generated for the County's VPDES permit report during the calendar year 2014.

Structural Controls - Best Management Practices

In 2014, the County certified a total of 46 BMP and SWM structures, 35 of those structures had associated phosphorus removal rates as detailed. Collectively, these structures have been designed to remove a total of 244.88 pounds of phosphorus (P) annually from 450.16 acres. A total of 194 existing BMPs and SWMs received routine maintenance by Drainage staff in 2014. Commercial and institutional property owners maintained another 210 private structures. Drainage staff performed maintenance activities on 34.98 miles of storm sewer infrastructure.

Source Controls - Public Information and Engagement Program

The public information and engagement program plays an important role in protecting water quality in the County. The program is divided into three categories: general outreach, education and volunteer activities. In 2014, WQ staff received more than 900 calls and emails from residents. The WQ staff's general outreach activities and participation included but were not limited to rain barrel workshops, the Stop the Drop Campaign/ P.U.P Club, the Plant More Plants Campaign/Chesapeake Club and the Stormwater 101 Program. The educational programs organized and participated in by Water Quality staff included but were not limited to educator training, Virginia Commonwealth University Teacher Institute, Greater Richmond Environmental Education Network, stormwater education workshops, student engagement programs and County staff training. Lastly, a comprehensive set of water quality focused volunteer programs are in effect in the County. These programs include but are not limited to: Chesterfield WaterTrends – Resident Volunteer Water Quality Monitoring, volunteer storm drain marking, volunteer cleanup efforts and volunteer buffer plantings.

General Services - Environmental Division Education and Outreach Programs

The Department of General Services –Environmental Division implemented and/or participated in three pollution prevention education and outreach programs in 2014 targeted toward the reduction of trash, debris and litter. These programs relate and contribute to the County's stormwater program by reducing the amount of floatable materials and debris conveyed to the stormwater system by rain or littering events. The three programs were a "Fool for Art/Environmental Fair" in April where staff addressed the general public on various pollution prevention strategies, a Falling Creek watershed cleanup event held in April and a Tire Amnesty Day event held in May.

Source Controls – County Pollution Prevention Projects

The County initiates and completes various short and long-term pollution prevention projects on County property that reduce impacts on the environment. Four projects were continued in 2014 that either directly or indirectly related to the County's stormwater system.

Plans and Regulatory Updates and Program Improvements

The County provides for the protection, improvement and preservation of the water quality of water bodies within and downstream of its boundaries through the County's comprehensive planning efforts and state and federal laws which are implemented through local ordinances, polices, education and other tools.

The Comprehensive Plan (2012) provides a vision for the future, enabling County officials and residents to anticipate and deal constructively with changes occurring within their community. During 2014, the County completed the necessary steps to carry out some of the goals and guidelines outlined in the Implementation Chapter of the plan. Staff amended County ordinance and in 2014 the County Board of Supervisors adopted local ordinance for the implementation of the Virginia Stormwater Management Program Regulations (9VAC25-870).

Several process improvements, such as erosion and sediment inspections performance and CBPA review requests for encroachment, were made to programs used in the implementation of existing regulations.

The County received 41 proposals for encroachment within the RPA and of those applications, 37 received approval. Staff confirmed 86 RPADs yielding 11.48 miles of new perennial streams and eighteen alleged RPA violation investigations were conducted yielding 10 NOVs. The County approved 141 plans for construction.

Storm Sewer System Maintenance and Improvements

During 2014, Drainage staff performed maintenance activities on 34.98 miles of storm sewer infrastructure**.** In 2014, EE completed a 1100 linear foot long drainage improvement project in the Huntingcreek Hills subdivision with a final project cost of $335,000.

Illicit Discharge, Storm Sewer and Water Quality Investigations

WQ staff conducted 232 water quality investigations, including 143 illicit discharge investigations resulting in 34 NOVs. The illicit discharge investigations were divided into seven categories: mop water/washwater, vegetation/sediment, organics, chemical, construction wastes, hydrocarbons, and miscellaneous. The two most common violations (mop water/washwater, vegetation/sediment) accounted for 87 of the 143 illicit discharge investigations.

WQ staff conducted screenings of 100 outfalls and four upstream structures. Of the 104 structures, 12 had dry weather flows that were analyzed in the WQ laboratory. Eight structures were classified as having potential or obvious illicit discharges and on-site investigations or follow-up visits at each of these outfalls have been conducted. Thirty-two (32) additional outfall screenings were performed at the County airport complex by a private consultant and the results of the outfall screenings indicated no significant issues related to stormwater discharges.

In 2014, Health investigated 88 septic complaints and issued 231 onsite sewage repair permits in the County. As a result of the complaint responses, investigations and onsite inspections, Health

issued a total of 39 Notices of Alleged Violation during 2014. Additionally, Health received documentation relating to 3,514 septic tank pump outs and 286 Alternative Onsite Sewage System inspections conducted in the County during 2014.

Wastewater maintained approximately 2,000 miles of sanitary sewer lines and responded to nine reportable public sanitary sewer incidences during calendar year 2014. Utilities corrected all problems and continues to employ strategies to prevent future issues. As part of regular maintenance and incident response, Utilities CCTV inspected 155,094.09 linear feet of sanitary sewer.

FEMS office reported twenty-two (22) occurrences in 2013 where FEMS personnel were dispatched to address incidences involving either the direct release of product to the County stormwater system or where there was a high probability a release would occur if not immediately remediated. In all of the instances, HAZMAT staff secured the site and contained the product to insure no further discharges occurred. HAZMAT personnel or commercial remediation contractors performed subsequent cleanup operations.

Detailed Watershed Assessments

Two detailed watershed investigations were conducted in 2014, the first occurring in Timsbury Creek, the second in a Tributary to Falling Creek. The investigation of Timsbury Creek consisted of a thorough visual assessment of the stream, nearby sanitary sewer junctions and manholes and the surrounding riparian corridor. Diminished riparian buffer and improper pet waste disposal was noted along the reach. The assessment of the Tributary to Falling Creek consisted of methods used in illicit discharge detection and elimination, and will continue into 2015.

Watershed level assessments were conducted within three drainage basins in 2014; four stream sites draining directly to the Appomattox River, six stream segments draining directly to the James River and at five reaches within the Michaux Creek watershed. Physical, chemical, biological, and habitat data were collected and analyzed with the results integrated into a water quality index score. The majority of these assessments indicated good (n=8) water quality conditions.

Management and Disposal of Used Oil and Toxic Materials

During 2014, approximately 56,902 pounds of used motor oil from Fleet were recycled or used as fuel at five County clean burn furnaces. Additionally, 820 pounds of used antifreeze and 9,602 pounds of oil solids (crushed filters and absorbents) were collected and recycled. At Fleet facilities, no reportable oil spills as defined by the EPA in the Clean Water Act and Oil Pollution Act occurred during 2014.

Facility Inspections

Four commercial and industrial facilities were inspected for stormwater compliance purposes. WQ staff conducted windshield survey inspections of commercial and industrial facilities and

found many of the incidents described above in "Illicit Discharge, Storm Sewer and Water Quality Investigations" or below in "Releases from Commercial/Industrial Facilities" as a result. No changes were made to the *Industrial and Commercial Facility Inspection Standard Operating Procedure Manual* in 2014.

Releases from Industrial/Commercial Facilities

Nine potential releases from industrial facilities were investigated. Potential releases included waste management issues, a materials spill, leaking plumbing and improper washwater disposal. Four releases were confirmed and corrective actions and/or cleanups were performed. Four releases were referred to VA DEQ and one release was found to be unsubstantiated after investigation.

Erosion and Sediment Control

In 2014, EE issued 108 LDP for 720.90 acres. There were 21,662 ESC inspections conducted for single-family dwellings, 5,354 inspections for development sites and subdivisions and seven inspections resulting from residents' complaints. One hundred eighty-nine (189) of the site and subdivision inspections resulted in the issuance of Notices to Comply. There were ten NOVs issued during the 2014 calendar year. The EE ESC program continues to be compliant with the Virginia Water Control Board in 2014.

§122.26 (d) (2) (iv) (A)
"A DESCRIPTION OF STRUCTURAL AND SOURCE CONTROL MEASURES TO REDUCE POLLUTANTS FROM RUNOFF FROM COMMERCIAL AND RESIDENTIAL AREAS THAT ARE DISCHARGED FROM THE MUNICIPAL STORM SEWER SYSTEM"

(1) "A description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants in discharges from municipal separate storm sewers."

Development can significantly alter landscapes by increasing imperviousness and changing drainage patterns, thereby increasing the volume and velocity of stormwater runoff from the site. Two groups of BMPs can be used to minimize the impacts of stormwater from developed areas: nonstructural site design or source control measures which prevent or reduce the generation of pollutants and structural BMPs that detain and treat stormwater to control for runoff volume and to reduce pollutant loading to receiving waters. The County has required structural stormwater controls since 1991 to meet post-construction site runoff requirements. Structural stormwater facilities are classified as SWMs, providing downstream flood control, or BMPs for quality and/or quantity controls.

Structural Controls

The construction and proper installation of BMPs and SWMs are verified in the field by a licensed engineer or surveyor and are subsequently certified by the County. Once a BMP or SWM is certified, it is entered into EE's database for tracking, inspection and maintenance. To date there are 795 certified structures present in the County.

Table 1. BMP/SWM facilities with phosphorus removal efficiencies certified in Chesterfield County, 2014. The "n" designation following the project names reflect the number of individual BMPs of that specific type certified onsite.

Project Name	Address	Type	HUC	Watershed	Receiving Waterbody	Acres Treated	P Removed (lbs/yr)
Branch's Bluff Section 4	9025 Proctors Run Ct	Retention	JL03	Proctors Creek	Trib to Proctors Creek	42.3	9.5
Central Concrete	12601 Genito Rd	Wet Marshy Bottom	JA42	Swift Creek	Nuttree Branch	4.1	1.6
Chester Village Green Apartments Phase II (n=4)	11330 Chester Garden Trl	Bio-retention	JI03	Proctors Creek	Great Branch	6.8	4.6
Colony Village Apartments	10220 Jefferson Davis Hwy	Wet Pond	JL03	Proctors Creek	Trib to Proctors Creek	50.6	20.2
Cook Out Restaurant	8240 Midlothian Tnpk	Filterra	JM86	Powhite Creek	Trib to Powhite Creek	0.2	0.2
Court Yard Retirement Center	6701 Court Yard Rd	Retention	JA42	Swift Creek	Trib to Swift Creek	8.6	1.0
Courts of Praise Parking Addition	7201 Iron Bridge Rd	Extended Detention	JL02	Kingsland Creek	Kingsland Creek	2.7	1.6
Hallsley Brightwalton Road Extension	1300 Old Hundred Rd	Retention	JA41	Swift Creek	Trib to Swift Creek	3.0	3.1
Heron Pointe (n=2)	15313 Heron Pointe Way	Retention	JA41	Swift Creek	Swift Creek	27.1	16.0
Intermediate Care Facility	6801 Lucy Corr Blvd	Wet Marshy Bottom	JL03	Proctors Creek	Trib to Proctors Creek	2.8	1.4
Logans Roadhouse Infrastructure	2301 W Hundred Rd	Wet Pond	JA45	Proctors Creek	Redwater Creek	14.5	6.5
Magnolia Green Section J (n=2)	7300 Vicenzo Dr	Bio-Retention	JA41	Swift Creek	Blackman Creek	2.9	1.4
Martins Food Store and Retail Shops (n=2)	200 Charter Colony Pkwy	Retention	JM83	James Rinver	Michaux Creek	138.9	36.4
Meadowville Distribution Center Amazon	1801 Meadowville Technology Pkwy	Wet Pond	JA45	Johnson Creek	Trib to Johnson Creek	99.3	100.2
Midlothian High School Renovations and Additions (n=3)	401 Charter Colony Pkwy	Filterra	JA41	Swift Creek	Little Tomahawk Creek	1.8	2.2
Partners Financial Federal Credit Union	14901 Dogwood Villas Dr	Filterra	JA41	Swift Creek	West Branch	0.3	0.3
Partners Financial Federal Credit Union	14901 Dogwood Villas Dr	Biofiltration	JA41	Swift Creek	West Branch	0.5	0.3
Perkinson Woolridge Road (n=5)	14001 Charter Park Dr	Bioretention	JA41	Swift Creek	Little Tomahawk Creek	1.9	2.2
Priority Volkswagen (n=2)	2000 Walthall Center Dr	Filterra	JA44	Ashton Creek	Trib to Ashton Creek	0.6	0.9
Priority Volkswagen	2000 Walthall Center Dr	Retention	JA44	Ashton Creek	Trib to Ashton Creek	6.3	7.6
Project Bulldog	12901 N Enon Church Rd	Retention	JA45	Johnson Creek	Trib to Johnson Creek	26.1	24.9
Victory Tabernacle Church of God Youth Center	11700 Genito Rd	Retention	JL02	Swift Creek	Nuttree Branch	8.9	2.8

In 2014, the County certified a total of 46 BMP and SWM structures, 35 of those structures had associated phosphorus removal rates as detailed in Table 1. Collectively, the 35 structures have been designed to remove a total of 244.88 pounds of phosphorus (P) annually from 450.16 acres.

Recorded County drainage easements require that BMPs and SWMs be properly inspected and maintained. In the County, two maintenance schedules are in effect. Commercial structures located outside of the Swift Creek Reservoir watershed or land area above the reservoir dam, are inspected the first year after certification and every three years thereafter. The inspection and maintenance is the responsibility of the owner of the facility. Schedules are tracked through a database that determines when necessary maintenance must take place. The database generates letters notifying facility owners of the need to perform an inspection.

Both the inspection and maintenance requirements for all subdivision structures throughout the County and those commercial property facilities in the Swift Creek Reservoir watershed are the responsibility of the County. The inspection and maintenance are normally performed on a yearly schedule by County staff. A total of 194 existing BMPs and SWMs received routine maintenance by Drainage staff. Commercial and institutional property owners maintained another 210 private structures.

Source Controls - Public Information and Engagement Program

The public information and engagement program plays an important role in protecting water quality in the County. The program is divided into three categories: general outreach, education and volunteer activities. General outreach occurs on a daily basis as staff interacts with the public. Staff members use the water quality publications and website to aid in public interactions. In 2014, the WQ staff received more than 850 calls and emails from residents. Other general outreach occurs by participating in events such as community fairs, regional social marketing campaigns and a variety of program offerings. The education program includes student engagement, educator training and County personnel training. Finally, volunteer programs exist for residents who show an interest in the environment or want to engage in water quality oriented programs.

General Outreach Programs

The general outreach programs are designed for all County residents. They are designed to raise awareness of water quality issues and prepare residents to be stewards of County waterways and the Chesapeake Bay.

Rain Barrel Workshops

Staff and community partners collaborated to offer rain barrel workshops for residents. Partners included Extension, James River Soil and Water Conservation District and County Public Libraries. Chesterfield Master Gardeners were trained as volunteers for the workshops and assisted staff with implementation. Workshops were held in April, May and June of 2014. Five workshops were held and ninety-four (94) rain barrels were constructed and put into use at County homes and surrounding areas. One hundred eight (108) people attended the workshops.

Stop the Drop Campaign / P.U.P Club

WQ staff served as the chairperson of the Richmond Regional Pet Waste Outreach Committee spearheading the Stop the Drop Campaign/P.U.P. Club. The program strives to educate the public about the importance of disposing of pet waste to reduce bacterial pollution in runoff and is a collaborative effort of the County, Henrico County, City of Richmond and other local environmental groups and non-profit organizations. The campaign stemmed from the James River Bacteria TMDL adopted in 2010 and was one of the recommendations made by the regional TMDL Implementation workgroup. In 2014, the P.U.P. Club maintained a social media page on Facebook. Posts on the page reached 870 people. In 2014 the Richmond Region Pet Waste Outreach Committee partnered with James River Association to secure a $64,419 grant from the U.S. E.P.A. Clean Water Section 319(h) Nonpoint Source Implementation Program. The grant will fund installation of pet waste stations in the County and the City of Richmond and fund outreach in targeted neighborhoods. WQ staff directed a pre-installation survey of dog droppings at Huguenot Park in Chesterfield. WQ staff noted a monthly average of 55 droppings on the main pedestrian trail between July and November of 2014. WQ staff will survey the trail in the same months of 2015 after a pet waste station is installed to monitor for improvement.

"Plant More Plants" Campaign/Chesapeake Club

The "Plant More Plants"/Chesapeake Club media campaign brought to the Richmond Metropolitan Region by the VA DCR in 2007 was continued in 2014. The outreach material for this campaign presents a message about proper lawn care and fertilizer use and is designed to affect behavior change by appealing to consumers' love of seafood and the Chesapeake Bay lifestyle. The "Plant More Plants" campaign encourages homeowners to plant native species of trees and shrubs in their yards to filter and absorb runoff. The 2014 campaign included internet advertising and in-store promotions with retail partners.

LID Program

EE encourages developers to use LID for the reduction of pollutants, volume and velocities of stormwater to adjacent streams and rivers. LID practices preserve and recreate the natural landscape and hydrologic conditions of a site by minimizing impervious surfaces and allowing for infiltration. Examples of LID practices include rain gardens, rain barrels, permeable pavers and bioretention areas. The EE website has a comprehensive list of LID resources for engineers and builders. The development community is encouraged to use these resources.

The Middle James Roundtable

The Middle James Roundtable is a consortium of stakeholders that brings people together to improve the health and water quality of the James River watershed. Participants include residents, businesses, civic organizations and government. WQ staff served on the Steering Committee in 2014.

The Roundtable was awarded a 2010 Chesapeake Bay Restoration Fund grant to support the design and printing of restaurant coasters and place mats about water quality stewardship. Roundtable partners including the County have the ability to customize the material with their own messages and logos. The project resulted in the production of 50,000 restaurant coasters and 62,500 educational placemats. To date, approximately 35,000 coasters and more than

60,000 placemats have been distributed to Roundtable partners statewide including schools and community groups in the County.

The Chesterfield County Water Quality Section Website
WQ's website is located at http://www.chesterfield.gov/EnvironmentalEngineering/and serves as a valuable tool for general education & outreach. All County publications mentioned in this report are available online, as well as, general water quality information and technical reports.

Education Programs

EE has created programs targeted at students and educators in the CCPSS. The programs are focused on educator training and student engagement. Additionally, the WQ staff is responsible for training County personnel in stormwater management techniques and pollution prevention. WQ staff also offers programs and training to local universities, businesses, civic organizations and volunteer organizations. These programs are designed to raise awareness of water quality issues.

Educator Training
WQ staff works with the CCPSS Science Lead Instructors in developing curriculum, Grants Administrator to securing funding and individually with teachers. The Enviroscape, a non-point source runoff training aid, and water quality monitoring kits are made available to teachers.

Virginia Water Monitoring Council
WQ staff presented a session about the county's rain garden program at the VWMC annual conference in June. Topics included workshop planning and rain garden installation and design. One hundred twelve (112) people attended the session.

Stormwater 101 Program
EE received a SLAF grant to create training modules for county staff and the local development community about the Runoff Reduction Method and the Energy Balance Equation. These methods were applied to development and redevelopment scenarios based on case studies of actual projects in the County. The training modules were presented at a training session in January. Fifty (50) engineers and designers from the development community attended the session.

Student Engagement Programs

A.M. Davis Elementary School Nature Buddies
In March, EE staff conducted a stream walk and macroinvertebrate presentation for students of the A.M. Davis Elementary School "Nature Buddies" Program. Topics included water quality and macroinvertebrate identification. Twenty-nine (29) students attended the program.

Robious Middle School Field Classes
EE and Parks collaborated to conduct field trips for the seventh grade classes of Robious Middle School. The students visited the Dutch Gap Conservation Area in March, April and May. Topics

included watersheds, water quality testing and safe recreation. One hundred sixty-two (162) students attended the programs.

Envirothon
WQ staff served as the aquatics coach for the Chesterfield Area Envirothon, an annual environmental science competition for high school students. In February, 18 students from three high schools participated in the team training. In March, 25 people attended the competition.

County Staff Training

The CCPLC conducts an Environmental Awareness Class for all new hires and any employee who wishes to attend. The class covers general environmental awareness and includes curriculum on stormwater pollution prevention. A total of 496 employees attended the class in 2014.

Departmental Trainings
Parks conducts a spill response training program for its employees to maintain its Environmental & Sustainability Management System (ISO 14001) certification. In 2014, 75 employees completed the training.

EE staff attended several training sessions offered by VA DEQ in 2014. Eighteen (18) employees attended the Stormwater Management Inspector Class. Six employees attended the Stormwater Management Basic class. Four employees attended the Stormwater Management Plan Review class. Six employees attended the Erosion and Sediment Control Inspector class. Two employees attended the Erosion and Sediment Control Basic class and the Erosion and Sediment Control Plan Review class. Four employees attended the VSMP Construction Stormwater Permit class.

Chesterfield Master Gardener Training
Extension runs the County Master Gardener Program. Master Gardeners offer landscaping help and run outreach programs to help residents manage their lawns and gardens in s sustainable manner. WQ staff teaches the water quality/ pollution prevention portion of Master Gardener training each year. In March, EE staff conducted training for 19 new Master Gardeners.

Volunteer Activities

A comprehensive set of water quality focused volunteer programs are in effect in the County. The following are the objectives of the water quality volunteer programs:

- Enhance public education activities and promote environmental stewardship
- Involve a cross-section of residents
- Complement the monitoring requirements of the County's VPDES permit
- Provide a team of resident monitors who can identify water quality improvements or degradation in their community.

Chesterfield WaterTrends – Resident Volunteer Water Quality Monitoring

Chesterfield WaterTrends is the County's official resident monitoring program. WaterTrends monitors collect data on a volunteer basis to indicate a general state of water quality throughout the County. Regular measurements of water quality were made by volunteers at 33 stream and river stations and two lake stations. There were 335 individual site visits conducted by 39 volunteer monitors, representing 479.2 hours of effort. Results were submitted and integrated into the VA DEQ non-agency database and are presented in detail within Section 2.3 of this report entitled *"2014 Chesterfield WaterTrends Report of the Quality of Select Streams, Rivers and Lakes in Chesterfield County, Virginia"*.

Volunteer Storm Drain Marking

WQ began the Storm Drain Marking Program in 2000 with a Chesapeake Bay Small Watershed Grant administered by the National Fish and Wildlife Foundation. Two thousand placards and supplies were purchased with this grant money. The placards include the name of the river, stream or reservoir that the area drains to as well as the anti-pollution message of "No Dumping!" and the County's illicit discharge hotline number. In 2001, the County received a second grant to purchase an additional 10,500 placards. In 2014, a variety of volunteer groups applied 207 storm drain markers in the county. (Table 2)

Table 2.Storm drain marking program statistics 2014.

Location	Watershed	Curb Markers Installed
Village at Swift Creek Shopping Center	Swift Creek	35
Colony Crossing Shopping Center	Swift Creek Reservoir	25
Woodlake Community	Swift Creek Reservoir	135
Robious Elementary School	James River	10
Business in Chesterfield SEP Program	Various	2
Total		**207**

Volunteer Cleanup Efforts

In June 2014, WQ staff collaborated with the Chesapeake Bay Foundation on its annual Clean the Bay Day. Ten volunteers participated in a cleanup of Pocoshock Creek near its intersection with Midlothian Turnpike and the end of Sturbridge Drive. More than 30 bags of trash and numerous bulk items such as tires and grocery carts were collected.

WQ staff helped coordinate the James River Regional Cleanup, hosted by the James River Advisory Council. This event takes place the second weekend of September and attracts hundreds of participants. Multiple County departments including Extension and Parks participated in the event. The County offered two sites for volunteers in 2014: Dutch Gap Boat Landing and the Falling Creek Ironworks Park. During the cleanup, 118 volunteers collected 134 bags of trash and 97 bags of recyclables.

In September, WQ staff collaborated with the Friends of the Lower Appomattox River and Virginia state University to conduct a volunteer cleanup of the Appomattox River. Twenty-eight (28) volunteers removed 25 bags of trash and numerous bulk items from the river.

Department of General Services Education and Outreach Programs

The Department of General Services-Environmental Division implemented and/or participated in three pollution prevention education and outreach programs in 2014 targeted toward the reduction of trash, debris and litter. These programs relate to the County's stormwater program by reducing the amount of floatable materials and debris conveyed to the stormwater system by rain or littering events. The three programs were Tire Amnesty Day on May 3, Chesterfield's Environmental Fair held on August 22 – 30 and Lake Chesdin Fall Festival held on October 5. A total of 3400 people attended these programs.

Outreach Materials

WQ continues to use the Water Quality Watch Fact Sheet series created in 1997 as a general outreach and education vehicle to residents and businesses. These publications are republished and updated as needed and when funds become available. Other publications have been created and distributed, as the need exists, such as the *Don't Feed the Lake* brochure and the *Rain Garden Installation and Design* booklet. Table 3 on the following page lists the County's current outreach materials.

Table 3.Chesterfield County Outreach Materials 2014.

Material	Type	Lead Group	Target Group
Chesterfield County Water Quality Section website: http://www.chesterfield.gov/content2.aspx?id=2851	Website	Water Quality	General public
Rain Garden Installation and Design	Booklet	Water Quality	General public
Chesterfield County Resource Protection Area Restoration Guide	Booklet	Water Quality	General public
Chesterfield County Resource Protection Area Restoration Guide *Chesterfield County Stormwater Management Program* *Chesapeake Bay Resource Protection Areas* *The Streams of Chesterfield County* *Homeowners Guide to Flood Plain Management* *Business & Industry Guide to Chesterfield County's Illicit Discharge Ordinance* *Household Guide to Chesterfield County's Illicit Discharge Ordinance* *Chesterfield County's Stormwater Drainage System*	Fact Sheet	Water Quality	General public
What is this Orange Slime in my Creek? *What is this Foam in my Creek?* *What are those Tubes in the Field?*	Fast Enviro Facts Sheet	Water Quality	General public
Don't Feed the Lake	Brochure	Water Quality	Residents who live near lakes
Storm Drain Markers	Plastic marker adhered to storm drains	Water Quality	General public
Chesterfield Extension Website: http://www.chesterfield.gov/HumanServices/ExtensionServices/exthome.asp	Website	Chesterfield Extension	General Public
Six Steps to Cleaner Water (lawn & home)	Brochure	Chesterfield Extension	General Public
Home Landscape Practices to Protect Water Quality	Brochure	Chesterfield Extension	General Public
Chesterfield County – Did you Know? (Fact sheet on lawn care)	Fact Sheet	Chesterfield Extension	General Public
Lawn Care Clinics (5 clinics in addition to being online)	Power Point Presentation	Chesterfield Extension	Interested Public
Five Ways to Help the James	Brochure & Ads in newspapers	Middle James Roundtable	General Public
James River Watershed Educational Placemats/Activity Sheets	Placemat/Activity Sheet	Middle James Roundtable	General Public

Source Controls – County Pollution Prevention Projects

The County initiates and completes various short and long-term pollution prevention projects on County property that reduce impacts on the environment. Four projects were completed or

continued in 2014 that either directly or indirectly related to the County's stormwater system (Table 4). The projects were initiated, administered and completed voluntarily by the County to prevent unwanted discharges to the environment.

Table 4. County pollution prevention projects related to MS4 ongoing or completed in 2014.

Pollution Prevention Project	County Department	Date Completed	Estimated Cost	Resulting Improvement
Rogers Building cooling tower water run off	Buildings and Grounds	Ongoing	Pending Funding	Reduction of cooling tower runoff to ground water & adjacent stream
Maintenance of chemical runoff from cooling towers	Buildings and Grounds	Ongoing	$2,490 Per Quarter	Eliminate the probability for environmental contamination.
Used Tire Recycling	General Services - Fleet Management	Ongoing	No Cost Incurred	Avoidance of stormwater runoff by keeping collected used tires inside the shop prior to recycling.
Street sweeper waste management	General Services- Fleet Management	Ongoing	$100 Per haul away and $25 Per Ton	Street sweeper waste now disposed of in container that accommodates sweeper hopper to dump directly into container.

(2) "A description of planning procedures including a comprehensive master plan to develop, implement and enforce controls to reduce the discharge of pollutants from the municipal separate storm sewer which receives discharges from areas of new development and significant redevelopment. Such plan shall address controls to reduce pollutants in discharges from municipal separate storm sewer after construction is complete."

Compliance with the above requirements are provided through the County's comprehensive planning efforts and state and federal laws which are implemented through local ordinances, polices, education and other tools. The goal of this element is to plan and help guide future growth and development decisions and provide for protective measures for controlling pollutants from existing development and reduced impacts of new and re-development projects on receiving waters. The following topics cover those items implemented because of the above requirements:

- Comprehensive Planning for Chesterfield County
- Regulatory Amendments, Adoption and Overview of Implementation
- Stormwater Treatment Facilities and Restoration Projects
- The County's Environmental Management System Policy
- County facility inspections (See §122.26 (d)(2)(iv)(B)(2)).

Comprehensive Plan for Chesterfield County

The WQP (Chesterfield County, 2002) established a series of goals, policies and implementation strategies in order to promote the protection of water quality. In 2012, the BOS adopted the

CompPlan. This document, developed by staff, effectively replaced all previous planning documents such as the WQP. However, the relevant WQP goals and strategies were refined and included into the CompPlan. The CompPlan includes several chapters designed to address the issues and challenges that face the County as the community continues to grow. Each chapter has guidelines based upon the principles of these goals. Achieving these goals will ensure the County continues to be a healthy, thriving community providing residents with a high quality of life, employers with a supportive business climate and visitors with positive historical, cultural, recreational and shopping experiences. The goals ensure that valued environmental resources are protected and where appropriate enhanced, through fair regulatory practices and regulations while accommodating growth and development consistent with the CompPlan. By incorporating environmental and sustainability principles, the CompPlan helps to ensure that what benefits present generations will not diminish the needs and aspirations of future generations. In 2012, VA DCR staff provided comments in support of the draft CompPlan.

During 2013, the County, guided by Planning, initiated steps necessary to carry out the goals and guidelines outlined in the Implementation Chapter of the CompPlan. The steps for implementation of the CompPlan fall into two categories, Phase 1 and Phase 2. Phase 1 contain steps that must be implemented quickly to carry out the CompPlan's major goals and guidelines. Phase 2 contains steps that will occur over a period of time to refine and enhance existing ordinances, plans, policies, strategies and educational programs. Many steps will require public participation and review, and approval by either, or both, the Planning Commission and the Board of Supervisors. This report contains discussions pertaining only to the components directly related to water quality improvement or permit compliance. Details of the CompPlan as well as the progress are located on the county website at: http://www.chesterfield.gov/compplan/.

Phase 2 - Implementation Scheduled Completed:

Virginia Stormwater Management Program

Current law and regulation require localities in the Commonwealth, designated as MS4s, to adopt a VSMP approved by and in accordance with the State Water Control Board. One of the key elements of the VSMP is a local ordinance that is consistent with the Stormwater Management Act and its attendant regulations which includes the General Permit for Discharges of Stormwater from Construction Activities. In 2014, staff proposed amendments to County ordinance Chapter 8 section 8-1 through 8-16 in accordance with the VSMP Regulations (9VAC25-870). The regulations provide localities the ability to manage the quantity and quality of stormwater runoff from construction activities. The State approved amendments were adopted by the BOS on April 9, 2014.

Educational Program

In 2014, in collaboration with the community, schools and libraries, county staff developed environmental awareness and educational programs to educate the public on water conservation practices and water resource protection. Outlined below is an overview of the two programs:

Water Resource Protection Education Program

County staff prepared and coordinated a comprehensive program of outreach and education activities to equip citizens with knowledge and resources to be stewards of the County's

waterways. Findings were presented to the Planning Commission and on July 9, 2014, the Administration approved the report.

Best Management Practices Teaching Opportunities at Public Facilities Education
County staff identified outreach and education activities in conjunction with existing or planned water quality/stormwater BMPs on county property. In 2014, staff presented the findings to the Planning Commission and on July 9, 2014, the Administration approved the report.

Phase 2 - Implementation Scheduled to begin in 2015:
Water Quality
The County will amend ordinances to address countywide application of Upper Swift Creek Ordinance with respect to the:

- Development standards, such as setbacks from RPAs, reduction in the amount of impervious areas, limited clearing in non-RPA floodplains and
- RPAs located in open space for new developments.

Erosion and Sediment Control
The County will revise existing policies to ensure that adequate ESCs are in place and properly maintained during construction.

Regulatory Amendments, Adoption and Overview of Implementation

Regulatory Actions
In 2014, the BOS held a public hearing on March 26 to discuss amendments to the stormwater management, erosion and sediment control, stormwater discharge ordinances and fee changes relating to EE.

In 2014, the Commonwealth transferred authority for implementation of VSMP to the County. The program has direct oversight of development activities including review of the SWPPP, inspections and enforcement. Minor changes also occurred to the "Erosion and Sediment Control" and "Discharges to the Stormwater System" ordinances. All three ordinances provide for application fees and fines for violations. Due to regulatory overlap, Chapter 8 of the County Code titled "Stormwater Management and Water Quality" now contains all three ordinances.

Erosion & Sediment Control Ordinance
The current version of the ESC Ordinance (Sections 8-17 thru 8-34 "Erosion and Sediment Control") may be found in Chapter 8 "Stormwater Management and Water Quality" of County Code. The regulation is to control soil erosion, sedimentation and non-agricultural runoff from regulated "land-disturbing activities" in order to prevent degradation of property and natural resources.

In 2010, EE implemented an in-house developed Program Administration Status System (PASS) to provide record keeping for state mandated requirements for plans review, project inspection activities, frequency and regulatory performance reporting. During 2014, our quality control program was updated to reflect a change in group management. EE added the position of Inspections and Floodplains Manager, who was assigned the responsibilities of Inspections

Group quality control. Every month, the manager employs a report-generating process in PASS to consistently select representative Land Disturbance Activity Permits for further review. Random permits are subsequently selected by the manager and assigned to each of the two supervisors in order to assess the program's performance with respect to the effectiveness and efficiency. As of July 1, 2014, this process started to include Land Disturbance Activity Permits subject to VA DEQ's VSMP permitting and inspection requirements.

Chesapeake Bay Preservation Ordinance

The current version of the County's Chesapeake Bay Preservation Ordinance (Chapter 19, Article IV, Division 4, "Chesapeake Bay Preservation Areas") may be found in the County Code. The regulation is for the protection and improvement of water quality in the Chesapeake Bay and its tributaries by requiring the use of effective conservation planning and pollution prevention practices when using and developing environmentally sensitive lands.

During 2014, the County continued its implementation of the CBPA. In 2014, EE made improvements to the application and reporting process for requests to encroach within RPA. In 2014, staff revised a series of informational draft guidance documents used to standardize the review process. Once finalized, the documents and application will be available on the county's website.

Resource Protection Area Designations

WQ staff is responsible for the administration of the RPAD process. Per the requirements of the CBPA, this process identifies environmental features on parcels that require a RPA. At the completion of the process, the identified features are mapped and the RPA boundary drawn around them. This process is completed prior to the tentative subdivision review, commercial site plan review and water quality impact assessments. Additionally, because of a change in the county's subdivision ordinance, RPADs are completed prior to the issuance of a new home building permit on parcels outside of subdivisions and prior to parcel platting.

During 2014, WQ staff conducted 86 RPADs. Of those designations, 27 were conducted on behalf of landowners and 59 were field verifications of private sector assessments. These efforts yielded approximately 11.48 miles of new perennial streams protected by RPAs buffers. To date, approximately 924 miles of perennial streams are covered by RPA in the County.

Resource Protection Area Development

During 2014, the County received 41 proposals for encroachment within the RPA. Of those proposals, one required a formal process with approval from the BOS; the remaining 40 required an informal or administrative process with approvals issued from EE.

Formal Exception Status

The BOS granted a single formal exception for the location of an accessory structure, or pool, associated with an existing single family home.

Administrative Approval Status

The following Table 5 provides the details of those requests for encroachments within the RPA that required EE approval.

Table 5. RPA encroachment requests (administrative) categories, 2014.

Type of Encroachment	Number Requested	Description	Number Approved
Expansion Sec.19-236	7	Existing Structure	7
Exempt Activities Sec.19-234a	7	Passive Recreation Trails (5) Waterwells (1) Public Utilities (1)	7
Permitted By Right Sec.19-232a	13	Water Dependent Activity (10) New Construction (1) Redevelopment (1) Private Driveway (1)	13
Buffer Modifications Sec. 19-232c	13	Access (0) Views & Management (10) Shoreline Stabilization (3)	9

Resource Protection Area Violations

During 2014, staff investigated 18 alleged RPA violations. Ten (10) required enforcement actions related to improper disturbance or clearing of the vegetation within the RPA. These identified projects required a site visit followed by the submission of a restoration plan. The plan outlined the area to be replanted or altered based upon the CBPA approved WQ's replanting guidelines. At the time of this report several of the cases were still on going and had not been resolved, therefore average length of time between the identification of the restoration project and the receipt of the corresponding approved corrective planting plan could not be determined. Planning - Code Enforcement Section took over primary responsibilities for RPA violations in 2014. WQ staff provides technical support to Planning in processing and handling RPA enforcement actions.

Floodplain Management Ordinance

The current version of the County's floodplain management ordinance (Chapter 19, Article III, Division 3, "Floodplain Districts") may be found in the County Code. The regulation restricts construction in flood plains, to prevent loss of life and property, hazards to health and safety, disruption of commercial and government services and to limit the unnecessary or excessive expenditure of public funds for flood protection.

During 2014, the County received and granted six administrative variances. All were for single-family residential homes and pertained to encroachments within the County required structural setback (25 feet or within the Upper Swift Creek Watershed 35 feet) from the existing floodplain boundaries, RPA or wetlands. In 2014, there were no public variances to appear before the County's Board of Zoning Appeal.

Upper Swift Creek Watershed Ordinance

The current version of the County's Upper Swift Creek Watershed Ordinance (Chapter 19, Article IV, Division 5, "Upper Swift Creek Watershed") may be found in the County Code. The regulation provides for additional practices designed to address pre and post development practices within the Upper Swift Creek watershed for protecting the water quality of Swift Creek

Reservoir, a source of the County's drinking water. Primarily the regulation limits residential subdivision development to a post-development total phosphorous load of 0.22 pounds per acre per year.

Development Review
EE and Planning staff review plans for proposed development for compliance with the above referenced ordinances. During 2014, between these two departments, 141 plans were approved. Of those plans approved, 61 were for commercial or industrial developments (site plans), 37 were for subdivisions and 43 were for other categories (*i.e.* linear projects or minor site plans).

Stormwater Treatment Facilities and Restoration Projects

Because of WASP assessments, the Pocoshock & Falling Creek watersheds were targeted in 2003 as "priority streams" requiring detail watershed investigations for pollution source(s) identification and mitigation practices. In 2014, VA DEQ recommended authorization for the county to receive a fifty percent grant funding under SLAF for three county projects totaling $1,620,636.00.

Pocoshock Creek Stream Restoration Project
To assist in this effort, the County in 2004 initiated the Pocoshock Creek Community Partnership. This is a coordinated effort between area residents, businesses and the County to improve water quality and physically restore portions of the creek that have become degraded. The stream restoration project covers approximately 5,500 linear feet. Improvements to the functions and value of the impaired stream channel will improve water quality and aquatic habitat in the creek. The project will establish a geomorphically stable stream channel using natural channel design principles and reducing the sediment load carried from the creek to Falling Creek Reservoir. As part of this project, the County contracted with KCI in 2003 for the development of design and construction plans for the stream restoration. In 2004, the County received the 30% construction design plan and the initial U.S. Army Corp of Engineers permit submittal package. Due to the costs associated with the construction, the project put on hold. In 2014, staff contracted with its consultant to reevaluate the site as part of the County's TMDL Action Plan to comply with Chesapeake Bay TMDL nutrient and sediment load reductions.

The proposed stream restoration project drains areas within the County's MS4 boundaries. The project is now as part of the CIP and is consider a stormwater retrofit for the treatment towards existing development. Pollutant reduction with respect to total nitrogen, total phosphorus and total suspended solids, because of the project, will be credited towards the TMDL for the regulated urban impervious & pervious source sectors loads to the James River Basin. The calculated projected annual pounds of total phosphorous reduced from stormwater as a result of the facility is 375 lbs. /year as total phosphorus. The estimated cost, excluding long-term maintenance, is $5,888.00/lb. of total phosphorus.

In 2014, the County contracted with ARCADIS to conduct stream and wetland assessments as well as hydraulic modeling. ARCADIS developed a conceptual plan for the project and conducted a site visit with county staff. In December 2014, ARCADIS provided the county with 50% construction plans, which are currently under review.

In 2015, the construction plans and bid documents will be completed. Advertisement for construction bid is scheduled for early fall.

Regional Stormwater Facility Project

In 2010, the County received a VWPP Individual Permit (Number 09-0471) for LTC 20/25 facility part of Watershed Management Master Plan and Maintenance Program for the protection of water quality draining to Swift Creek Reservoir.

LTC-20/25 is a proposed watershed-level regional stormwater pond with a sediment forebay. Once completed, the dam will create 4.0-acre main pond with a sediment forebay that will impound and treat runoff from an unnamed tributary to Little Tomahawk Creek. It will receive stormwater runoff and baseflow from the 368-acre drainage area via the unnamed tributary and directly from the contiguous portion of the watershed. Flow out of the watershed level pond will be via a concrete spillway within an earthen impoundment. A low-level outlet is to maintain base flow and release water at a cooler temperature. Design details such as a labyrinth weir structure, aeration devices, and depth modifications will aerate stormwater before it enters the downstream channel. The calculated projected annual pounds of total phosphorous reduced from stormwater as a result the facility is 234.1 lbs./year as total phosphorus. The estimated cost, excluding long-term maintenance, is $7,505.00/lb. of total phosphorus.

In 2014, staff and its consultant updated the approved construction plans and prepared the bid documents. A request, submitted to VA DEQ, modified the existing Virginia Water Protection (VWP) Individual Permit No. 09-047. The request was to change the required stream compensatory mitigation from offsite stream restoration to the purchase of mitigation bank credits. VA DEQ approved and reissued the modified permit on June 11, 2014.

In 2015, award of construction contract will be finalized and construction should begin in the spring of 2015 and finish early fall.

Mid-Lothian Mines Park Stream Restoration Project

The Mid-Lothian Mines Park stream restoration project, located in the Falling Creek watershed, was to provide mitigation for the stream impacts for construction of LTC 20/25. In 2014, as a result grant-funding requirements, the county modified its permit to exclude the project from mitigation. On July 11, 2014, staff submitted a pre-construction notification pursuant to a Nationwide Permit 27 to the U.S. Army Corps of Engineers.

The restoration reach is located on County property and within the Mid-Lothian Mines Park. The project will provide 1747 linear feet stream restoration effort and includes retrofitting three stormwater outfalls that currently discharge untreated stormwater runoff from residential development. These retrofits, a step pool system, rain garden and level spreader include an educational component while demonstrating three options for reducing water quantity and quality impacts on the receiving stream. The calculated projected annual pounds of total phosphorous reduced from stormwater as a result the project is 115.6 lbs. /year as total phosphorus. The estimated cost, excluding long-term maintenance, is $7,333.00/lb. of total phosphorus.

In 2015, the construction plans and bid documents will be completed and construction should begin in the summer of 2015 and finish early fall.

Wrens Nest Road Project
Initiated in 1992, the Wrens Nest Road project provided for drainage improvements to for the Powhite Creek drainage area. The primary goal of the project, funded through the CIP, is to alleviate flooding and standing water in the Settlers Landing Subdivision.

The proposal includes, stabilization of an eroding drainage channel having extremely steep side slopes along the length of the channel. The widening and deepening of the channel caused by severe streambed and bank erosion has affected private and public utilities as well as adjacent accessory structures (e.g. sheds and fencing) and vegetation. Staff engaged the adjacent 28 property owners, VADEQ and the U.S. Corps of Engineers during and after the study in order to elicit support for the project, potential remedies and final design. The calculated projected annual pounds of total phosphorous reduced from stormwater as a result the project is 78.2lbs/year as total phosphorus. The estimated cost, excluding long-term maintenance, is $8,225.00/lb. of total phosphorus.

In 2015, award of construction contract will be finalized and construction should begin in the spring of 2015 and finish early fall.

Riparian Buffer Maintenance
WQ staff conducted four site inspections at prior buffer plantings: Swift Creek at Bailey Bridge Road, Swift Creek at Pocahontas State Park, Pocoshock Creek at Twilight Lane, Falling Creek at Meadowbrook Apartments and West Branch at Burnt Mills Lane. Each site was assessed for plant survival and maintenance needs. Tree tubes and stakes were removed from plants that did not survive and from those that no longer required shelter.

The Swift Creek site at Pocahontas State Park continued to show satisfactory progress. Improved maintenance practices have allowed naturally occurring plants and trees to become established. The site shows approximately 50-70% coverage.

The Swift Creek site at Bailey Bridge Road was found to be in better condition than in 2013. In the fall of 2013, a Chesterfield WaterTrends volunteer reported that much of the site had been bush-hogged for maintenance access. In 2014, volunteer growth had recovered in much of the area. The buffer shows at least 50% coverage.
The sites at Falling Creek and West Branch were both planted in 2010 as part of the Riparian Stewardship Program. The site on West Branch at Burnt Mills lane exhibited a good overall success rate (>65%). There were no losses in 2014.

The Meadowbrook Apartments site showed a moderate improvement since 2013. There were no losses in 2014 and remaining trees continued to grow well. The site shows approximately 50% coverage. WQ staff will continue to monitor the site.

Environmental Management Policy

The August 31, 2007 County's Environmental Management Policy remains current and in effect. The policy is considered the foundation for the County's Environmental Management System (EMS) and emphasizes a commitment to regulatory compliance, pollution prevention and continuous improvement, especially related to County property and facilities. A copy of this updated policy memorandum and letter is again included in Appendix A.

(3) "A description of practices for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer system, including pollutants discharged as a result of deicing activities."

Operating and Maintaining Public Transportation

As has been reported in previous years, the VDOT maintains 99% of the roads in the County, and the County has no authority to regulate that agency. No changes to regulatory authority or processes were required or implemented in 2014.

Stormwater and Stream System Maintenance

Drainage staff continues to maintain a database for recording stormwater and stream system maintenance. The database tracks field installation events, and maintenance or repairs completed. The system also categorizes the service events according to the type of service performed (*i.e.* leaves removed, removal of downed trees, *etc.*). The 2014 data showed that the majority of the material removed from the system was vegetative debris, with a very small fraction falling within the trash and sediment category. During 2014, Drainage staff performed maintenance activities on 34.98 miles of storm sewer infrastructure. Staff will continue to review these reports and make any modifications to the Stormwater Management Program that are deemed necessary based on the information obtained.

County drainage easements are inspected at the time of state road acceptance. The County then holds a bond on those easements for 12 months after roads have been accepted into the state system. At the end of the 12-month period, another inspection is done and the developer is required to fix any problems before the bond is released. Maintenance from that time is on a complaint driven basis. While there is no regular inspection process in place, WQ staff look for problems in drainage easements when conducting field activities such as storm sewer mapping, outfall screening and detailed watershed investigations. Any problems found or areas in need of repair are then reported to the EE Drainage Superintendent.

(4) "A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving water bodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from stormwater is feasible."

Flood Management Projects

Forty-six BMP and SWM facilities were certified in the County in 2014. Thirty-five of the certified BMPs are rated for annual phosphorus removal (Table 1). The stormwater management portions of these structures work to attenuate water flows. Maintenance on these and existing facilities are discussed in paragraph one of this report. In 2014, EE completed a 1100 foot long drainage improvement project in the Huntingcreek Hills subdivision with a final project cost of $335,000.

(5) "A description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges.

Municipal Landfills

During the summer of 2012, as part of the County's corrective action process, four additional seep drains were installed along the eastern side slope of the Carver Heights landfill in an effort to mitigate leachate day-lighting at the subsurface and possibly entering the stormwater conveyance system. While the seep drains have minimized leachate day-lighting on the side slope, there are observable areas of flowing water leading to the stormwater conveyance system, particularly after rain events and during periodic wet weather. In a continual effort to dewater these areas, and minimize possible impacts to the stormwater conveyance system, the county is removing approximately 4000 gallons of groundwater from the seep trenches per week.

Additionally, the County is currently in the process of installing a permanent leachate collection system. This system will depress groundwater in the areas of the seep drains. Capturing and depressing groundwater in these areas will keep groundwater, impacted by leachate, below the subsurface. The leachate collection system will move impacted groundwater to the public treatment works. This project is expected to be completed by the spring/summer of 2015.

The County has elected to maintain an updated SWPPP for Bon Air, Carver Heights, and Northern Closed landfills. This includes quarterly visual monitoring of the stormwater outfalls, an annual comprehensive site evaluation, and annual training for SWPPP team members on a volunteer basis.

The County operates and maintains two convenience centers for residents to dispose of household trash and debris, as well as offering many recycling opportunities. ED oversees operations at these convenience centers. In 2014, no discharges to onsite stormwater systems

were observed or reported at the two convenience centers. Detailed inspection reports are available through ED upon request.

(6) "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from the municipal separate storm sewer associated with the application of pesticides, herbicides and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications and other measures for commercial applicators and distributors, and controls for application in public rights-of-way and municipal."

Education & Outreach regarding Pesticide, Herbicide and Fertilizer Use

General Public

Thousands of publications are distributed every year by both WQ and Extension regarding the proper use and disposal of pesticides, herbicides and fertilizers. Numerous publications are available to the general public regarding the home use of herbicides, pesticides and fertilizers and their effects on water quality. One such publication is *Six Steps to Cleaner Water*. A list of all water quality related publications is detailed in Table 3. These publications are available through a number of means including walk-ins, telephone requests, the Internet and seminars. In 2014, 188 residents registered for six lawn care seminars across the county that focused on using alternatives to turf, converting to warm-season turf, proper fertilizing and weed control strategies to protect water quality and conserve water. Additional seminar registrations include 195 registrants for seminars on various topics, including proper tree care and pruning, shade gardening, gardening with native plants, gardening for wildlife, preparing the garden for winter and appropriate plant selections. Native plants are better adapted to the County's local climate and have less need for fertilizer and pesticide use.

Extension again implemented the Grass Roots program for county residents. In 2014, 136 residents participated in the program. This accounted for 287 soil samples analyzed and over 1,638,488 square feet of privately owned turf enrolled in program. Registration for this program is conducted on a first-come, first-serve basis. Volunteer master gardeners make site visits to registered homeowners during which the master gardener measures the lawn(s), collects soil sample(s), and evaluates the health of the lawn. The Agriculture and Natural Resource Technician makes personalized fertilizer and pH adjustment recommendations to each homeowner stressing integrated pest management and the September, October, and November fertilizing program for cool-season lawns. The Grass Roots program provides numerous lawn care publications as needed and four quarterly newsletters. Turf enrolled in the Grass Roots program is included in the total square footage of turf under VA DCR nutrient management plans.

In addition to providing valuable information to residents, Extension is conducting surveys among Grass Roots participants to evaluate lawn care practices such as timing for fertilizer application. In addition to providing valuable information to residents, the Chesterfield Cooperative Extension Office is conducting surveys among Grass Roots participants to evaluate lawn care practices such as timing for fertilizer application. Results of the most recent survey (2011) indicated that 89% of the respondents fertilized following the SON program, 89% actively kept lawn products out of the storm drain and 92% practiced integrated pest

management (*i.e.* applying chemicals appropriately to lawn only after the problem was diagnosed).

WQ and Extension also use the *List of Lawn Care Operators with Water Quality Agreements* that is maintained by the VA DCR. This program certifies applicators of herbicides, pesticides and fertilizers who enter into a voluntary water quality agreement "by following proper lawn fertilization practices and recommending sound homeowner lawn maintenance practices by following a Nutrient Management Plan approved by VA DCR". The lawn care companies also agree to teach their employees to use the Nutrient Management Plan to responsibly apply and handle lawn care products. There are currently seven commercial lawn care companies in the Richmond area that serve the County. The list can be found at: http://www.dcr.virginia.gov/soil_and_water/wqagree.shtml#water_quality_companies.

Commercial and Municipal Applicators

Both private and commercial applicators of pesticides are required by Code of Virginia (2VAC20-51-20) to hold a current Virginia Pesticide Applicator's Certificate, as regulated by the VDACS. Municipal applicators are included in the commercial, not-for-hire category. To become certified, the individual must follow a three-step process. First, the individual must apply for a license. Second, the individual must submit a nonrefundable certification fee unless otherwise exempt. Third, the individual must pass an examination that demonstrates the individual's education and training in pesticide application for a designated category appropriate for the type of pesticides used. After passing this examination, certified applicators are required to renew their certification every two years by attending a VDACS Board-approved recertification course during the two-year period. Approved recertification courses are offered by numerous organizations including Extension. Currently, the County Agent participates in joint regional recertification programs that are conducted throughout the year at various locations including the County, Prince George and Henrico Counties. Commercial pesticide applicators nearing the end of their two-year certification are notified by mail of the upcoming, qualified courses and urged to attend. The County Agent assisted with two 42-hour initial certification trainings with J. Sergeant Reynolds Community College. Fourteen students took part in each of the two sessions for a total of 28 students in 2014. One session was held at the County Extension office and the other took place at J. Sergeant Reynolds Community College in Goochland County.

§122.26 (d)(2)(iv)(B)
"A DESCRIPTION OF A PROGRAM, INCLUDING A SCHEDULE, TO DETECT AND REMOVE ILLICIT DISCHARGES AND IMPROPER DISPOSAL INTO THE STORM SEWER"

The major tasks currently being implemented to conform to the above requirement are as follows:

- Water quality investigations and enforcement;
- Private sanitary system investigations and enforcement;
- Public sanitary system maintenance and repair
- FEMS spill response;
- Storm drain marking program;
- Field screening evaluations;
- Detailed Watershed Investigations and Assessments, and;
- Management and Disposal of Used Oil and Toxic Materials.

(1) "A description of a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal separate storm sewer system."

Water Quality Investigations and Enforcement

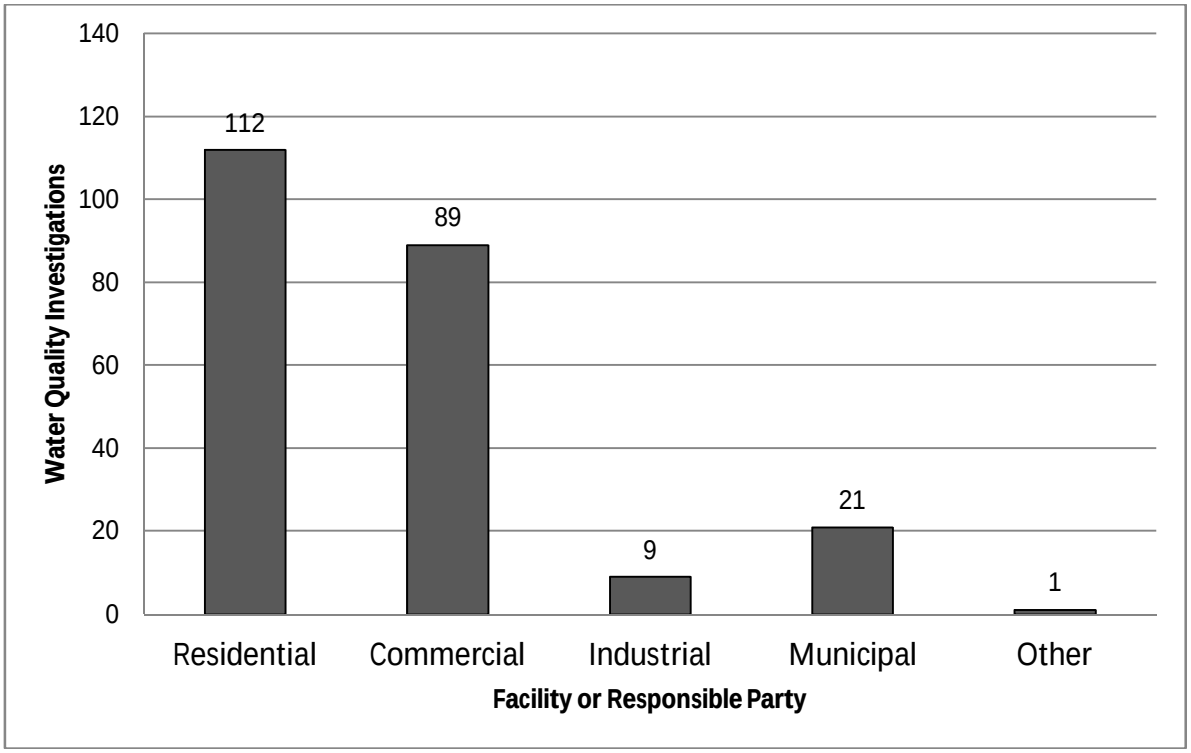
WQ staff performed 232 investigations in 2014 regarding water quality concerns, spills and other environmental concerns. Reports from residents, various county and state departments or WQ staff initiated these investigations. Of those investigations, 143 were illicit discharge investigations, 79 were other water quality or environmental concerns and 10 were municipal sewage releases to surface or stormwater systems. Figure 1 depicts the types of facilities or responsible parties involved in the water quality investigations. Figure 2 depicts the categories of illicit discharge investigations. A summary of all water quality investigations conducted in 2014 is included in Appendix A.

The number of investigations conducted was only slightly less than the number conducted in 2013 but still greater than the number of investigations seen in previous years during this permit. The ongoing effort to detect and eliminate illicit discharges was split between two staff positions. One employee focused on water quality investigations and enforcement, commercial/industrial inspections, and spill response while the other focused on outfall screening and watershed investigations.

Most of the investigations were classified as residential, meaning they occurred in residential areas and/or the responsible party was identified as a resident. The 112 residential investigations included 63 improper disposals of vegetation/sediment and 8 incidents involving hydrocarbons. Of the 232 investigations, 97 were at businesses or the responsible party was identified as a business, either commercial or industrial (Figure 1).These incidents often involved restaurants, grocery stores, pressure washing services, mobile vehicle washers and construction-related

businesses. The 21 municipal incidents include 10 sewage releases along with a few incidents of washwater release and vehicle maintenance issues that occurred at County facilities or on County property. An investigation that occurred as the result of abnormal results in a creek observed as a part of the monitoring program was classified as 'other'.

Figure 1. Water quality investigation categories, 2014

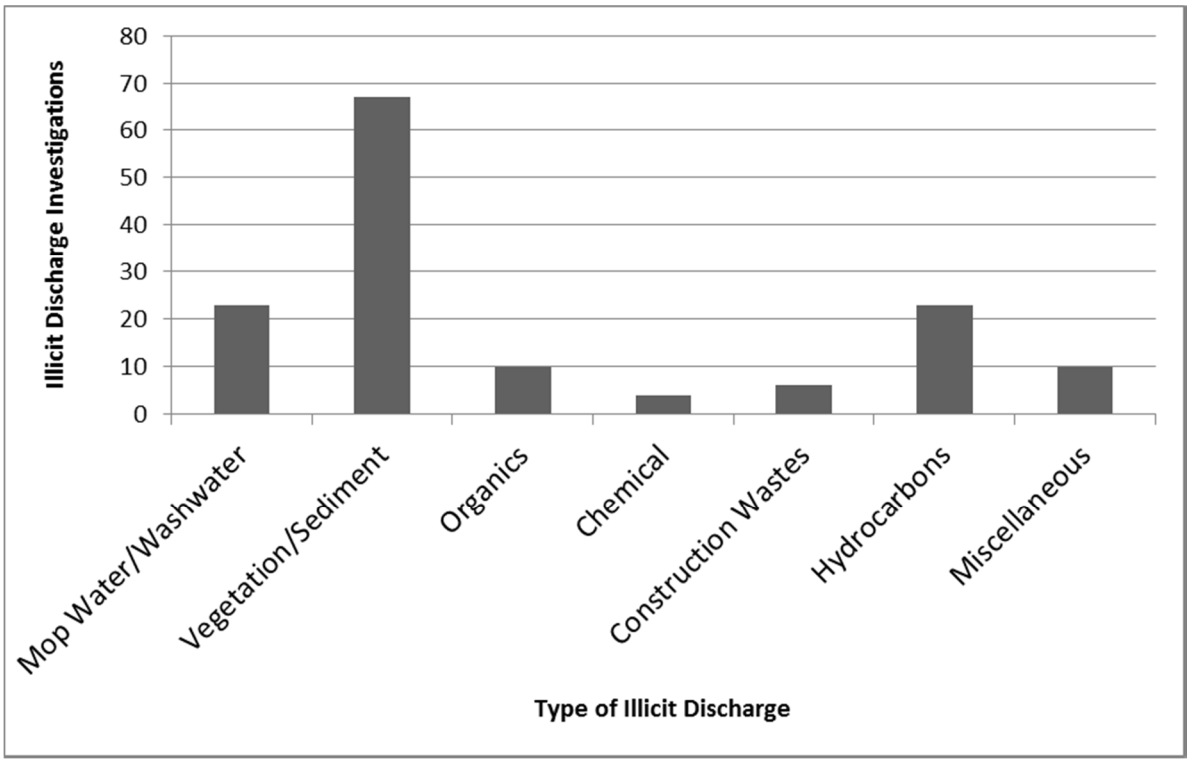


The category of water quality concern represented a variety of environmental issues, often resulting in referral to other sections within the County or other state and federal agencies after investigation by WQ staff. Common issues falling under the category of water quality concern include sheens from iron bacteria, algal blooms, illegal dumping not associated with surface or stormwater, drainage or erosion concerns and the filling of wetlands or other water bodies best addressed through remedies other than the IDO.

The 142 illicit discharge investigations were divided into seven categories, as illustrated in Figure 2. The mop water/washwater category included improper discharges from mobile and fixed vehicle washing, restaurant and equipment cleaning, pressure washing and indoor cleaning activities where the wastewater was disposed of outside. Most incidents within the vegetation/sediment category represent the improper disposal of yard debris into the drainage system, with a few representing the disposal of soil or sediment. The organics category included non-municipal sewage releases, grease and compost spills at food service establishments. Examples of the chemical category included discharges from swimming pools and industrial spills. The construction waste category represented materials such as paint, sheetrock mud, concrete washout and slurry, solvents and construction debris. The hydrocarbon category represented releases from vehicle accidents, auto repair shops, home vehicle repair, construction

equipment leaks and home heating oil. The miscellaneous category included dumping of trash and liquid drippings from trash trucks, dumpsters and compactors.

Figure 2. Number and types of illicit discharge investigations, 2014



A total of 34 NOVs representing 33 incidents were issued as enforcement actions of the IDO. Illicit discharge investigations often result in corrective actions even when an NOV is not issued. For example, if a release or spill had not yet reached the storm sewer system, an NOV may not be issued but a corrective action such as vacuuming up the product may be requested. Similarly, in 2014 WQ staff continued to send warning letters to potentially responsible parties when the complaint was about yard debris dumped in the drainage system. A follow-up inspection was performed approximately two weeks after the letter was mailed and if the problem had been resolved, a NOV was not issued.

Private Sanitary Systems Investigations and Enforcement

Health is tasked with responding to complaints and issues regarding private sanitary systems (septic tanks and drainfields) in the County. Although many of these may not directly affect the County storm sewer system, many have the potential to affect groundwater and may potentially discharge to the County's MS4 and surface waters. As a result, data regarding Health's efforts as they may relate to preventing illicit discharges are included in this report. In 2014, Health investigated 88 septic complaints and issued 231 onsite sewage repair permits in the County. Because of the complaint responses, investigations and onsite inspections, Health issued 39

Notices of Alleged Violation during 2014. Additionally, Health received documentation relating to 3,514 septic tank pump outs and 286 Alternative Onsite Sewage System inspections.

Public Sanitary System Maintenance and Repair

Wastewater Collections maintained approximately 2,000 miles of sanitary sewer lines and responded to nine reportable public sanitary sewer incidences during calendar year 2014. The reportable incidences included four caused by an accumulation of grease in various locations in the collections system, two caused by tree roots that had infiltrated the lines, two mechanical failures at pumping stations and one seal failure at an abandoned diversion structure. In the cases where grease had accumulated, the lines were cleaned, a CCTV inspection was performed and the addresses were added to a list of more frequent preventive maintenance inspections. The incidents where tree roots had infiltrated the lines, repairs were made to prevent a reoccurrence. Both of the incidences involving pumping stations have been resolved by replacing the pump impellers at the Johnson Creek Pump Station and repairing a mechanical flow gate at the Sunnybrook PS Pump Station. The incident involving a seal failure at an abandoned diversion structure has been repaired. As part of regular maintenance and incident response, Utilities CCTV inspected 155,094.09 linear feet of sanitary sewer. Copies of the incident reports submitted to the VA DEQ are included in Appendix A.

Fire Department Spill Response

FEMS reported 22 occurrences in 2014 where FEMS personnel were dispatched to address incidences involving either the direct release of product to the County storm sewer system or where there was a high probability a release would occur if not immediately remediated (Table 6). Of these occurrences, 14 were related to vehicle fuels released due to accidents, ruptured fuel tanks/lines or pump malfunctions. In all listed incidents, fire personnel secured the site and contained the product with subsequent mitigation and cleanup operations performed by either HAZMAT personnel or commercial contractors. Additionally, FEMS personnel responded to multiple incidences during the course of the year involving insignificant fluid releases from vehicle crashes not affecting the storm sewer system. In these cases, absorbents were applied to prevent the spread of the fluids and cleanup was conducted as required. Detailed reports of each incident are archived and are available for review at the FEMS office.

Storm Drain Marking

A total of 207 storm drain placards were installed throughout the County in 2014. A total of 205 storm drain placards were installed by the Volunteer Storm Drain Marking program. Details of this program are presented in §122.26 (d) (2) (iv) (A) (1) *A Description of Structural and Source Control Measures to Reduce Pollutants from Runoff from Commercial and Residential Areas that are Discharged from the Municipal Storm Sewer System* of this report. EE staff placed an additional two (2) placards on inlets as part of a Supplemental Environmental Project begun in 2012. The Supplemental Environmental Project concluded in 2014 with the distribution of SWPPPs describing BMPs to food service establishments and auto repair facilities.

Table 6. Responses by Chesterfield County Fire and EMS involving MS4, 2014

Date	Address	Event	Product	Source
01/10/14	9800 Government Center Parkway	Leak	~10 Gal. Diesel Fuel	Leaking Fuel – Truck
01/13/14	Planters Wood Road & Heritage Woods Road	Leak	< 5 Gal. Motor Oil and Diesel Fuel	Equipment Rollover
04/02/14	1900 West Hundred Road	Leak	Gasoline	Leaking Fuel Tank
04/10/14	North Chesterwood Drive & Cogbill Road	Leak	Hydraulic Fluid	Hydraulic Fluid Line Failure
04/15/14	Doss Road & Hull Street Road	Leak	Diesel Fuel	Damaged Saddle Tanks
04/16/14	9150 Burge Avenue	Leak	~5 Gal. Diesel Fuel	Damaged Saddle Tank
04/24/14	2700 Woodmont Drive	Leak	Household/Office Solvent/Chemical	Mechanical Failure
06/02/14	Midlothian Turnpike & Grove Road	Leak	Hydraulic Fluid	Hydraulic Fluid Line Failure
06/13/14	15913 Searchlight Court	Release	Gasoline	Leaking Fuel Tank
06/26/14	6200 Kingsland Glen Drive	Leak	Mixed Non-Hazardous Chemicals/Antifreeze	Leaking Abandoned Barrels
07/28/14	1521 Ware Bottom Spring Road	Leak	~10 – 15 Gal. Diesel Fuel	Leaking Fuel Tank
07/30/14	14801 Bride Spring Drive	Spill	~1.5 – 2 Gal. Emulsified Asphalt	Unknown – No Source Identified
08/01/14	3102 Tanners Way	Leak	~30 – 36 Gal. Gasoline	Punctured Fuel Tank
08/01/14	2401 Bermuda Hundred Rd	Leak	~5 Gal. Diesel Fuel	Leaking Fuel Tank
08/02/14	Hull Street Road & Duckridge Boulevard	Leak	~10 Gal. Gasoline	Vehicle Accident
08/05/14	3027 Allandale Drive	Leak	~17 Gal. Gasoline	Punctured Fuel Tank
09/04/14	12201 South Chalkley Road	Leak	Diesel Fuel	Leaking Fuel Tank
09/11/14	5300 Omo Road	Leak	Oil	Leaking Abandoned Barrels
10/02/14	8118 Babbler Lane	Leak	Oil	Leaking Vehicle
11/24/14	Midlothian Turnpike & Boulders Parkway	Leak	~30 Gal. Hydraulic Fluid	Vehicle Accident
12/01/14	12400 Redwater Creek Road	Leak	~4 – 6 Gal. Gasoline	Leaking Fuel Tank
12/18/14	288 NB between Lucks Lane and Woolridge Road	Leak	Diesel Fuel	Leaking Fuel Tank

(2) "A description of procedures to conduct on going field screening activities during the life of the permit, including areas or locations that will be evaluated by such screens."

Field Screening Evaluations

WQ staff continues to implement the IDDE Field Screening Program. The purpose of this program is to identify and investigate non-stormwater flows that are entering the County's storm sewer system, and to eliminate those non-stormwater flows if they are not one of the authorized discharges allowed by the IDO. This program was designed using the recommendations of the

Center for Watershed Protection's *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments,* October 2004.

In 2014, 104 outfalls and upstream structures were screened using protocols described in the County's *Outfall Reconnaissance Inventory Standard Operating Procedures Addendum* (last revised January 23, 2012). Of the 104 structures screened, eight outfalls (7.7%) were characterized as having potential or obvious illicit discharges. Follow-up inspections were conducted at these eight outfalls revealing the following:

- Outfall 748-682-02 contained grease, paintballs and a foul odor. An inspection of the surrounding area revealed improper handling and disposal of materials by a paintball business. An independent contractor performed cleanup, and the company was educated about improper disposal prevention.
- Outfall 724-698-001 contained a dry-weather plunge pool. An immediate investigation was conducted of upstream structures. Groundwater seepage was attributed as the cause of the dampness.
- Outfall 724-698-002 contained brown benthic growth and a dry-weather flow with a slight cloudiness. An immediate investigation of upstream structures revealed the source of the flow to be from residential irrigation. The excessive algae present at the outfall may be attributed to lawn fertilization.
- Outfall 730-706-005 was inspected because of the observance of a large amount of dry weather flow in an upstream structure. The source of the flow was revealed to be a ruptured drinking water pipe on private property that was repaired following the investigation.
- Outfall 760-658-02 contained improperly disposed yard debris. Enforcement action was taken and responsible party was required to clean-up discarded leaves. Residents were also educated on properly disposing of household materials and yard debris.
- Outfall 796-658-04 appeared to have a flocculent in the plunge pool that was determined to be suspended clays.
- Outfall 730-694-08 contained improperly disposed yard debris near the drainage easement. Further investigation revealed the yard debris was not improperly disposed of within the drainage system. Residents were educated on proper disposal of yard debris.
- Outfall 730-264-04 contained improperly disposed yard debris near the drainage easement. Further investigation revealed the yard debris was not improperly disposed of within the drainage system. Residents were educated on proper disposal of yard debris.
- Outfall 730-726-11 contained improperly disposed yard debris within the drainage easement. Residents were educated on proper disposal practices. A follow-up inspection confirmed the materials were removed and properly disposed.

The following is a brief summary of the Field Screening Standard Operating Procedure:

1. A desktop evaluation is performed to identify specific locations or drainage areas with significant potential to contain contaminated dry weather flows and to identify areas that have not been screened in recent years.

2. Field screening of physical and chemical parameters is conducted to identify those outfalls with dry weather flows or indicators of contaminated intermittent flows at non-flowing outfalls.
3. Detailed investigations are conducted when contaminated flows are identified or suspected in order to identify the source(s) of the contamination. These detailed investigations may require source tracking, dye testing and other investigatory methods.
4. Pollutant sources are eliminated when identified, under the authority of the IDO and other regulations and codes.

The field inspection process consisted of collecting general information and a description of the outfall and upstream system. For the outfalls exhibiting dry weather flows, additional instream physical and chemical measurements were obtained through field and laboratory analysis of samples using a two-tiered testing regime of indicator parameters. All dry weather flows were analyzed with using either a Hydrolab Minisonde 4a and Surveyor or Hydrolab Minisonde 5 Multiprobe SE for the following parameters: dissolved oxygen, pH, conductivity, total dissolved solids and temperature. Additionally, samples from dry weather flows were analyzed in the WQ laboratory for the most or all of the following tier one parameters: ammonia nitrogen, nitrate+nitrite nitrogen, phosphate phosphorus, turbidity, fluoride, potassium and calcium hardness. Some dry weather flows were analyzed for one or more of the second tier parameters, which include alkalinity, *E. coli*, surfactants and total chlorine.

Field observations and data collected from both field and laboratory results were archived in the Outfall Screening Database. Copies of completed outfall screening sheets from the 2014 reporting year can be found in Appendix A.

Four upstream structures were inspected in lieu of an inspection at the outfall because the outfall was submerged or inaccessible. Of the total 104 inspected structures (including outfalls and upstream structures), analyses were conducted for 16 (15.4%) that had dry weather flows or standing water. A table summarizing the chemical data from these structures can be found in Appendix A.

WQ staff wrote a SAP in 2013. Revisions to the SAP were made on April 16, 2014. A revised copy of the SAP may be found in Appendix A.

In addition to the outfall screenings conducted by WQ staff, ED retained the services of the consulting firm EEE to monitor stormwater outfalls at the County Airport Complex. This monitoring is conducted to fulfill requirements of the Airport's VPDES Industrial Stormwater General Permit and is included in this report as the stormwater outfalls drain to County waters. During 2014, staff from EEE visually monitored eight outfalls on a quarterly basis for a total of 32 outfall screenings. The results of the outfall screenings indicated no significant issues related to stormwater discharges.

On May 8, 2014, personnel from EEE and airport staff conducted an onsite annual SWPPP compliance evaluation. The evaluation included reviews of existing worksheets and plans, inspections of spill response equipment and visual assessments of the eight outfalls. The results of this evaluation indicated there were no incidents of non-compliance identified for FY 2014, meeting the requirements of the facility's SWPPP and related VPDES discharge permit.

Additionally, as part of the new VPDES permit requirements for the airport, personnel from EEE updated the Airport SWPPP to include 8 newly defined outfall locations as well as sample these locations for industrial Sector S and Chesapeake Bay TMDL analytical requirements. All samples analyzed comply with the permit requirements with zero exceedances reported. Copies of the Quarterly Monitoring Reports, Annual Compliance Evaluations, Discharge Monitoring and Reporting and Laboratory Analytical Reporting, are included in Appendix A.

The County operates an outdoor firearms range at the Public Safety Training Area near Enon for law enforcement personnel weapons training and qualification. Concerns over soil accumulation of lead residue from bullets and the consequent discharge of stormwater containing and transporting lead via the storm sewer system to Johnsons Creek prompted annual monitoring of these areas. Since 2005, ED has contracted for sediment sampling of the stormwater channel draining the onsite stormwater management basin and Johnsons Creek for lead. Fifteen sediment samples were obtained on August 20, 2014; 10 samples from the aforementioned stormwater channel and Johnson Creek, two duplicate quality control samples, and three samples from the stormwater detention basin. These samples were analyzed for lead and compared to previously obtained values. Lead concentrations among the ten sites surveyed ranged from <6.4 to 16 mg/kg in the stormwater channel and Johnson Creek, and were evaluated as similar to previously observed values. First year sampling of the stormwater detention basin revealed lead concentrations ranging from 33 to 500 mg/kg, indicating that the stormwater detention basin is operating as designed to minimize pollutants from entering the drainage channel leading to Johnson Creek. All of the measurements recorded in the stormwater channel and Johnson Creek were substantially lower than the 400mg/Kg human health risk based screening level for residential scenarios and the 800mg/Kg human health risk based screening level for commercial exposure scenarios recognized by VA DEQ. Only one of the samples taken in the stormwater channel and Johnson Creek between 2005 and 2014 has exceeded 100 mg/Kg, thus suggesting a limited lead impact to the storm sewer system and creek. A complete copy of the 2014 sediment sampling report is included in Appendix A for further review.

(3) "A description of procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or sources of non-stormwater (such procedures may include: sampling procedures for constituents such as fecal coliform, fecal streptococcus, surfactants (MBAS), residual chlorine, fluorides and potassium)…"

Detailed Investigations and Watershed Assessments

Timsbury Creek at South Street

A detailed watershed investigation of Timsbury Creek near the South Street road crossing was initiated on April 22, 2014 in response to elevated *E. coli* concentrations detected during a pilot program of bi-monthly *E. coli* screening of Monitoring Site ECS-49. The purpose of this investigation was to visually assess the immediate upstream watershed for any potential sources of coliform pollution. To complete the inspection, WQ staff visually assessed approximately 1.5 miles of Timsbury Creek immediately upstream of the South Street road crossing. The sanitary

sewer manholes adjacent to the stream were checked along this 1.5-mile reach, in addition to surveying storm sewer outfalls and riparian conditions along the reach.

The watershed of Timsbury Creek upstream of the South Street road crossing is approximately 2,828 acres and is approximately 3.3 linear miles long from its headwaters along Branders Bridge Road to South Street. The watershed upstream of South Street contains mixed residential, commercial and agricultural zoning classifications (A, R-9, R-12 R-15, R-TH, C-2 and C-3). The majority of homes in the watershed upstream of South Street are connected to the municipal sanitary sewer system, but a small residential area on the western boundary of the watershed is primarily connected to septic systems.

The watershed was distinctly divided into five sections, based on sanitary sewer junction and storm sewer outfall locations. Working upstream, the lower section was bordered primarily by undeveloped properties and wetlands. The second and third segments were bordered by older residential developments. The fourth segment was bordered by mostly undeveloped properties. The fifth segment was the northernmost segment and consisted of mixed residential developments.

The middle portion of the watershed (second and third segments) was notably the most impacted, with the greatest concentration of riparian disturbance in the watershed. Many residences back up to the edge of the stream. The scent of domestic animal waste was noted in this portion and observed as deposited near the edge of the channel. Multiple outfalls were observed visually and examined for dry weather flows and illicit discharge indicators, but no abnormal conditions were found to exist at the outfalls along this section of the watershed. The upper portions of the watershed lie within less intensively developed and undeveloped parcels and surrounding development appears to have minimally affected the watershed. The riparian buffer in this portion of the watershed was in overall good condition. The northernmost site in which a visual assessment was conducted was the Harrowgate Road crossing.

E. coli pollution appeared to stem from residential impacts along the middle portion of the watershed. The elevated *E. coli* levels may be attributed to improper pet waste disposal that was observed. No deliberate dumping of pet waste into the stream was observed, but the diminished riparian buffer was likely not preventing the runoff of pet waste into the stream channel. *E. coli* concentrations in the subsequent summer months remained elevated, but the levels dropped below the state water quality standard in the autumn months.

Tributary to Falling Creek

WQ staff initiated a detailed watershed investigation of a tributary to Falling Creek on February 11, 2014 in response to elevated conductivity, total dissolved solids, ammonia nitrogen and nitrate+nitrite nitrogen concentrations discovered during monthly ambient monitoring of the Tributary to Falling Creek WQ-89 site. Originally, a pollution complaint was initiated on January 27, 2014 after very high conductivity levels were observed at the WQ-89 monitoring site. Initial investigation concluded that the likely source of the high conductivity was attributed to recent intensive rock salt application at shopping centers upstream of the monitoring site due to recent snow events. However, the subsequent monthly visit to WQ-89 in February revealed that the conductivity, total dissolved solids, ammonia nitrogen and nitrate+nitrite concentrations

were still elevated and the rock salt was no longer present in quantity in the contributing watershed area. The purpose of the study was to identify potential point and non-point sources of pollution within the watershed that may be contributing to the abnormal results observed at monitoring site WQ-89.

This unnamed Tributary to Falling Creek is located near the intersection of Courthouse Road and Midlothian Turnpike and the portion of the watershed under investigation is approximately 91 acres in size. The headwaters of the tributary are located near the Target shopping center located at 11229 Midlothian Turnpike, where a large storm sewer system serving the shopping center's parking lot drains to a stormwater BMP. This BMP discharges into a concrete trapezoidal ditch that runs west towards Branchway Road. The concrete channel transitions to a piped system as it crosses under Branchway Road and again at Courthouse Road. The culverts crossing under Courthouse Road discharge the stream into a highly incised natural channel. The watershed consists of intensive commercial and light industrial development (C-5, C-3, I-1, O-2 and A). Most of the commercial establishments are connected to a municipal sanitary sewer system, although some of the older commercial areas are still connected to septic systems. All of the industrial properties in the watershed are connected to municipal sanitary sewers.

The watershed has been surveyed extensively throughout 2014. Since the tributary is channeled entirely through storm sewer systems before discharging to a natural channel southwest of the intersection of Courthouse Road and Busy Street, it was decided that the storm sewer system would be bracketed using standard illicit discharge detection and elimination techniques in an attempt to isolate a particular suspect branch. During a field survey in February 2014, extremely high conductivity levels were traced upstream to a branch of the storm sewer system that exclusively drained the properties located along International Drive. The concrete channel draining International Drive was improperly graded and water standing in the channel was observed to have extremely high conductivity levels (> 1500µS/cm). The nearby sanitary sewer lines were dye tested to determine if there was sewage seeping into the storm sewer system; no dye was observed in the storm sewer system, concluding that the sanitary sewer lines were not affecting the storm sewer system. During the field survey, the highest conductivity was observed (approximately 1900µS/cm) in a storm drain at 11301 International Drive. This inlet was observed as having a 12" RCP pipe, origin unknown, connected to it.

WQ staff performed a brief interior and exterior inspection of the property at 11301 International Drive. No improper disposal or illicit connections were observed or suspected during the inspection. In the spring, the Utilities department assisted WQ staff by using a remote controlled device to visually screen the storm sewer pipes at 11301 International Drive. The unknown 12" RCP pipe was found to connect to a trench drain located in a loading bay at 11301 International Drive.

In November 2014, WQ staff performed an extensive examination of the entire watershed. The watershed was divided into five major branches and staff inspected storm sewer inlets, pipes, channels, manholes and outfalls in each of the branches. Windshield surveys and visual assessments of commercial and industrial facilities draining to the watershed were performed. Hydrolab readings were taken at any storm sewer facility having dry weather flows and samples were collected for laboratory analysis. Elevated conductivities were observed throughout the

watershed, but the highest conductivities (> 3300µS/cm) were found to emanate from weep lines draining into the tributary behind the Target shopping center.

The detailed watershed investigation will continue in 2015. Further analysis of the weep lines and surrounding electrical and fire vaults will be performed in an effort to determine if groundwater inputs may be a source of the abnormal results. Copies of field sheets and laboratory analyses are available upon request.

Watershed Assessments of County Stream Systems

Watershed level assessments were conducted within three drainage basins in 2014; four stream sites draining directly to the Appomattox River, six stream segments draining directly to the James River and at five reaches within the Michaux Creek watershed. The major reason for the selection of these watersheds was limited data regarding detailed water quality in these drainage systems. Additionally, these three watersheds contained stream segments currently listed on VA DEQ's impaired waters list (303d) as impaired for either not supporting aquatic life (low pH) or recreational contact (*E. coli* bacteria).

Sampling occurred in the spring as a component of the County's WASP. Physical, chemical, biological and habitat data were collected and analyzed. Results were integrated into a multivariable approach that synthesized the bioassessment and habitat categorical data as well as select chemical observations into a single water quality index score, comparable as a percentage of an ideal reference condition (100%). The results of this analysis are outlined in Table 7. The majority of the assessments indicated good (n=8) water quality conditions.

Table 7. Water quality scores and categories for assessed watersheds, 2014.

Site Number	Stream	Station Location	Date	% Comparison to Reference Condition	Water Quality
APR-01	Fleets Branch	On VSU Campus Downstream of East River Road	4/1/2014	33.3	Poor
APR-02	Stoney Creek	Downstream of Trents Bridge Road	3/31/2014	77.8	Very Good
APR-03	Tributary to Appomattox River	Downstream of St. Audries Drive	3/31/2014	100.0	Excellent
APR-04	Cattle Creek	Downstream of Ivey Mill Road	3/31/2014	77.8	Very Good
JR-04	Spring Creek	Downstream of Old Gun Road East	3/27/2014	33.3	Poor
JR-05	Tributary to James River	Downstream of Ashwell Drive	3/24/2014	44.4	Fair
JR-06	Tributary to James River	Robious Landing Park East of James River Road	3/24/2014	44.4	Fair
JR-07	Tributary to James River	Robious Landing Park West of James River Road	3/24/2014	55.6	Fair
JR-08	Marine Spring Branch	Downstream of Kings Farm Drive	3/27/2014	77.8	Very Good
JR-09	Roberts Branch	Upstream of Crossings Way	3/27/2014	66.7	Good
MCX-01	Michaux Creek	East of RT288	4/9/2014	66.7	Good
MCX-02	Tributary to Michaux Creek	East of RT288 - Upstream of MCX-01	4/9/2014	88.9	Excellent
MCX-03	Tributary to Michaux Creek	Southwest of North Otterdale Road	4/1/2014	77.8	Very Good
MCX-04	Tributary to Michaux Creek	Downstream of Lastingham Drive	4/9/2014	44.4	Fair
MCX-05	Michaux Creek	End of North Otterdale Road	4/1/2014	55.6	Fair

Details concerning individual sites are summarized and presented in Section 2.1 of this report entitled "*2014 Assessment of the Biology, Habitat and Chemistry of Select Streams and Watersheds of Chesterfield County, Virginia"*. Details about the development of the scoring protocol are discussed in section five ("*Identification of Water Quality Improvements and Degradation*") of this report.

(6) A description of educational activities, public information activities and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.

Management and Disposal of Used Oil and Toxic Materials

The Department of General Services operates a public household hazardous waste program at no cost to residents by offering the disposal of items such as paint, oil base paint, varnish, thinners, shellac, stains, tints, polyurethane, primers, varsol, mineral spirits, turpentine, various flammable solvents, oil additives, gasoline, used oil, diesel fuel, kerosene, brake fluid, anti-freeze, oil filters, pool and photo chemicals, pesticides and herbicides. The County collects the waste at its convenience centers and contracts with a qualified firm for proper disposal or recycling. Information regarding this program is available on the County website. Brochures are available for residents by request and are distributed at special events. In 2014, the County accepted approximately 44 tons of household hazardous waste and approximately 27,000 gallons of used oil.

During 2014, approximately 56,902 pounds of used motor oil from Fleet were recycled either through FCC Environmental or used as a fuel at five County clean burn furnaces. Additionally, 820 pounds of used antifreeze and 9,602 pounds of oil solids, including crushed oil filters and absorbents, were collected and recycled through FCC Environmental Services. Nine oil water separator systems, one of which discharges directly to the County's stormwater system, were inspected and cleaned in May and November 2014. Aboveground oil storage tanks and piping were inspected on a monthly basis. There were no reportable oil spills in 2014 at any of the Fleet facilities as defined by the SEPAL in the Clean Water Act and Oil Pollution Act. Detailed inspection reports are available through Fleet upon request. We continue to hold a yearly Spill Prevention, Control And Countermeasures Plan (SPCC) training and spill drills at each of our Fleet locations. In addition, we perform a daily visual and a monthly written above ground oil storage and fuel storage tank inspection at all of our Fleet and fuel locations.

The County operates a Public Safety Training Area for the training of law enforcement and fire personnel. The training facility is comprised of specific areas for police and fire staff to conduct training specific to their respective operations. Examples of activities conducted here include firearms training, an emergency vehicle operations (driving) course and firefighting suppression procedures. Limited amounts of hazardous materials are present on site to facilitate the training. The use and disposal of these materials are addressed in detail within the Environmental Handbook- Standard Operating Procedures documents for the Enon Police Training Facility and the Enon Fire Training Facility.

§ 122.26 (d)(2)(iv) (C)
"PROGRAM TO MONITOR AND CONTROL POLLUTANTS IN STORMWATER DISCHARGES TO MUNICIPAL SYSTEMS FROM MUNICIPAL LANDFILLS, HAZARDOUS WASTE TREATMENT, DISPOSAL AND RECOVERY FACILITIES, INDUSTRIAL FACILITIES SUBJECT TO 313 OF TITLE III (SARA), AND INDUSTRIAL FACILITIES THAT THE MUNICIPAL PERMIT APPLICANT DETERMINES ARE CONTRIUBUTING A SUBSTANTIAL POLLUTANT LOADING TO THE MUNICIPAL STORM SEWER SYSTEM"

(1) "A program to identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

Facility Inspections

Four commercial and industrial facilities were inspected for stormwater compliance purposes during 2014 (Table 8); three inspections were industrial inspections and the other was a contract compliance inspection of a commercial facility.

WQ staff conducted windshield survey inspections throughout the year of commercial and industrial facilities and found many of the incidents described below in "Releases from Commercial/Industrial Facilities" or above in "Water Quality Investigations and Enforcement" as a result.

As a means of prioritizing facilities for inspection, businesses have been categorized numerically from one (least potential) to five (greatest potential) based upon their risk to the environment. Inspection protocol requires facilities that are categorized "5" or "4" be given top priority. The following list describes facilities within each category.

- "Category 5" is generally assigned to facilities that meet two or more of the following criteria: handling hazardous materials; collecting waste for treatment, disposal or recovery; having a VPDES/VSMP/RCRA/Pre-treatment Program permit; SARA Title III facilities; or the facility has had a release in the past three years.
- "Category 4" is generally assigned to facilities that have a VPDES/VSMP/RCRA/Pretreatment Permit; are a SARA Title III facility; handles hazardous waste; or are an operating or closed municipal landfill.
- "Category 3" is generally assigned to facilities that have a potential, because of their type of business, for an illicit discharge, such as automobile service centers.
- "Category 2" is generally assigned to facilities that have been known to have an occasional discharge, such as restaurants.
- "Category 1" is generally assigned to facility types that have little or no chance of an illicit discharge, such as office complexes.

Table 8. Facility inspections performed, 2014

Date	Facility	Category	Site Address	Type	Reason
01/16/14	Flagstop Car Wash	2	2500 W. Hundred Rd	Commercial	Contract compliance request
01/31/14	Mid-Atlantic Detailing Products	3	10800 Trade Rd	Industrial	Water Quality Investigation
02/18/14	Heartland Express	3	1515 Ware Bottom Spring Road	Industrial	Concurrent with Pretreatment Inspection
03/05/14	Kaiser Aluminum	4	1901 Reymet Rd	Industrial	Water Quality Investigation

In all of these inspections, copies of the *Business and Industry Guide to Chesterfield County's Illicit Discharge Ordinance* were distributed to the facility representatives. Copies of the aforementioned commercial and industrial inspection field sheets, memoranda and reports are on file with EE and are available for review upon request.

In addition to the commercial and industrial inspections, municipal inspections of 21 of the Chesterfield County Fire Stations were performed in 2014. During these inspections, WQ staff identified stormwater management opportunities and reported on corrective action plans to address potential issues. Modifications to behavioral and operational procedures have been addressed and there are continued discussions to address stormwater management opportunities that would be a significant expenditure. These changes will be addressed in future reports.

In 2014, WQ staff finalized the Supplemental Environmental Program, which required the distribution of spill kits, and SWPPPs outlining BMPs to automotive repair and food service establishments. Ten walk-through inspections were conducted at five automotive repair facilities and five food service establishments as a requirement of the Supplemental Environmental Program. The purpose of the walk-through inspections was to provide guidance to facility staff members on performing self-assessments to identify BMPs aimed at reducing the risk of non-stormwater discharges.

Chesterfield County Environmental Management System Compliance Audits

There were no environmental compliance audits conducted in 2014 to evaluate compliance with state, federal and other environmental laws and regulations. There are currently four audits scheduled to be completed in 2015. The audits are completed to satisfy the County's Environmental Management System Evaluation of Compliance Procedure. The audits allow for Opportunities for Improvement to be identified and are documented in individual departmental Corrective Action Requests and followed up within 90 days of the audit for status of the findings.

(2) Describe a monitoring program for stormwater discharges associated with the industrial facilities identified in (d) (2) (iv) (C) of this, to be implemented during the term of the permit, including the submission of data on the following constituents: any pollutants limited in effluent guidelines; any pollutants listed in an existing NPDES Permit for a facility; oil and grease, COD; pH; BOD5; TSS, total phosphorous, TKN, nitrate plus nitrite nitrogen.

Releases from Industrial Facilities

Nine industrial facilities were the subject of water quality investigations, as noted in Figure 1 and Table 9.

Table 9. Industrial facility potential releases, 2014

Date Inspected or Reported	Facility	Category	Site Address	Incident	Resolution
1/28/2014	Kaiser Aluminum	4	1901 Reymet Rd	Leaking pipe	Compliance
1/30/2014	Mid-Atlantic Detailing Product	3	10802 Trade Rd	Waste management	Compliance, referral for VPDES permit
2/18/2014	Heartland Express	4	1515 Ware Bottom Spring Rd	Illicit discharge	Compliance, referral for VPDES permit
4/29/2014	Honeywell Resin	4	4101 Bermuda Hundred Rd	Illicit discharge	Reffered to DEQ
6/2/2014	Hill Phoenix	4	1301 Battery Brook Pkwy	Waste management	Reffered to DEQ
6/4/2014	Masonomics	4	1501 Willis Rd	Waste management	Reffered to DEQ
7/1/2014	Industrial Chemicals, Inc	3	2540 Bellwood Rd	Permitting inquiry	Reffered to DEQ
10/2/2014	ACF Environmental	4	5020 Castlewood Rd	Suspect illicit discharge	No illicit discharge
10/16/2014	Southeastern Freight Lines	4	1551 Ware Bottom Spring Rd	Illicit discharge	Compliance

In January 2014, Pretreatment reported Kaiser Aluminum had a pipe connected to an oil-water separator that was leaking to the ground. The oil water separator was removed and an industrial inspection of the facility was performed.

A realtor contacted EE prior to the purchase of property located at 10802 Trade Rd. Several 55-gallon drums were abandoned and some were leaking. Bungs were placed in drums that were leaking and all drums were placed inside. This issue was referred to the permitting section of VA DEQ.

In February 2014, Pretreatment reported a potential non-stormwater release from Heartland Express to the County's storm sewer system. An informal unannounced inspection was conducted. EE Staff observed used motor oil and absorbents outside on cement from a leaking pump and soapy water running off the exit pad and into a vegetated area that flows to a drainage system. Heartland Express performed a cleanup of the improperly disposed motor oil and absorbents and modified maintenance procedures for activities in the future. This issue was referred to the permitting section of VA DEQ.

Pretreatment reported a nylon polymer pellets spill at the Honeywell Resin facility. The pellets were observed entering a storm drain. The plant was discovered to discharge directly to the James River and was referred to VA DEQ.

Pretreatment reported the Hill Phoenix facility for improper waste management. Cardboard and other wastes were entering a private storm system that flows to waters of the state. The solid

waste issues were referred to the pollution response program at VA DEQ. The facility was referred to the permit section at VA DEQ for potential general VPDES permit coverage.
In June 2014, VA DEQ reported the improper disposal of various fluids at Masonomics. This incident was referred back to VA DEQ because there was no county storm sewer on property. There was a response by Chesterfield Fire Marshall's and a notice of violation was written.

Industrial Chemicals, Inc. inquired about the need for a general stormwater permit based on the facility industrial classification. The facility was advised and referred to the permitting section of VA DEQ.

In October 2014, a report that ACF Environmental released vehicle washwater without containment and improperly handled waste and other materials was made. An informal inspection and response to this allegation was performed and the reports were found to be unsubstantiated.

Pretreatment reported Southeastern Freight Lines was washing vehicles outside and not containing the washwater. Operational changes were suggested for future washing activities and the incident was referred to VA DEQ because of the facility's general VPDES permit.

Updates to the Industrial/Commercial Facilities Inspection Program

In 2012, the *Industrial & Commercial Facility Inspection Standard Operating Procedure Manual* was modified in response to comments made by the EPA during the audit process. No changes were made in 2014. This document is available upon request from EE.

§122.26 (d)(2)(iv)(D "A PROGRAM TO IMPLEMENT AND MAINTAIN STRUCTURAL AND NON-STRUCTUAL BEST MANAGEMENT PRACTICES TO REDUCE POLLUTANTS IN STORMWATER RUNOFF FROM CONSTRUCTION SITES"

(1) Procedures for site planning which incorporate consideration of potential water quality impacts

Land Disturbance Permits

EE issued 108 LDPs (720.90 total disturbed acres) to ensure compliance with the minimum standards and practices required in conjunction with the regulations pertaining to Virginia's Erosion and Sediment Control Law (Table 10). BI issued 989 permits for the construction of single-family residences (113.51 disturbed acres).

Table 10. Land disturbance and single-family residence permits issued by month during 2014 and the associated disturbed acres.

	LDP	Disturbed Acres	Single Family Residence	Disturbed Acres
January	6	17.19	72	8.26
February	7	34.93	69	7.92
March	6	37.94	66	7.58
April	9	48.59	92	10.56
May	12	102.44	95	10.90
June	12	57.67	97	11.13
July	10	162.18	108	12.40
August	12	89.33	85	9.76
September	10	57.59	73	8.38
October	13	63.05	84	9.64
November	5	17.54	74	8.49
December	6	32.45	74	8.49
Total	108	720.90	989	113.51

The description of these 108 land disturbance permits and 989 single-family residence permits can be found in the monthly ESC reports submitted to VA DEQ. Copies of these reports can be made available upon request.

(2) A description of requirements for nonstructural and structural best management practices.

Best Management Practices

Please refer to §122.26 (d) (2) (iv) (A), *"A Description of Structural and Source Control Measures to Reduce Pollutants from Runoff from Commercial and Residential Areas that are*

Discharged from the Municipal Storm Sewer System" for details regarding BMP/SWM facilities in Chesterfield County (page 9 of this report).

(3) A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of the soils and receiving water quality.

Construction Site Inspections - Erosion & Sediment Control

EE staff is responsible for inspections and enforcement of the VA DCR required ESC Program and Virginia Stormwater Management Program (VSMP). EE began site and single family home inspections associated with the VSMP on July 1, 2014. In 2009, in an effort to improve compliance with VA DCR ESC Program, EE began working in conjunction with BI. Building inspectors conduct ESC inspections concurrently with their inspections of single-family dwellings. In 2014, 21,662 ESC inspections were conducted for single-family dwellings and 5,354 inspections for development sites and subdivisions. Resident complaints accounted for an additional seven inspections in 2014. One hundred eighty-nine (189) of the site and subdivision inspections resulted in the issuance of Notices to Comply. There were ten NOVs issued during the 2014 calendar year. The EE ESC program continues to be compliant with the Virginia Water Control Board in 2014.

(4) Educational and training measures for construction site operators.

Educational and Training Measures for Construction Site Operators

As previously reported, applicants for LDP must designate a Responsible Land Disturber who has been trained in erosion and sediment control techniques and who is to oversee compliance with all approved erosion and sediment control measures on that site. As of this writing, several thousand contractors have now received certification through the state training and certification program. Additionally, inspectors from BI have been certified by the state to assist in compliance inspections for single-family residential construction projects. All EE ESC inspectors have completed the VSMP Basic and Inspectors stormwater management program courses taught by VA DEQ per the requirements of the new VSMP certification program. Two EE staff members have taken and passed the VSMP inspector certification exam and are fully certified as VSMP inspectors. The remaining inspectors are anticipating completing VSMP inspector certification in 2015. The EE Web page contains education information regarding ESC. The link for this site is: http://www.chesterfield.gov/content2.aspx?id=2836